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Original Articles.

THE VALUE OF DIAGNOSIS IN BACK LESIONS.*

BY JAMES WARREN SEVER, M.D., BOSTON,

Junior Assistant Surgeon, Children's Hospital, Boston; Consulting Orthopedic Surgeon, Cambridge Hospital; Orthopedic Surgeon, Waltham Hospital.

THE title of my paper is a bit misleading, and should be read as the necessity of a correct diagnosis in back lesions. There is no question in anyone's mind as to the necessity or value of a diagnosis in any case, but it is essential that such a diagnosis be as correct as possible to enable not only the medical man to treat it properly, but also to furnish the Compensation Board and Insurance Company with correct information on which to base their findings.

For several years now it has been my good fortune to have seen many cases with stiff and painful backs for the Massachusetts Industrial Accident Board, as an impartial examiner. These have been sent to me for examination and diagnosis originally in the course of some dispute as regards the individual's disability, which of course involves his being entitled to compensation.

It has been a great surprise to me to find that a large number of these cases showed fractures of one or more vertebrae—so-called crush fractures—which had wholly escaped notice, and therefore treatment. Many of these individuals had gone for periods of time varying from several weeks to even a year, with no diagnosis and no treatment. It has seemed to me that to bring such a condition to your attention was well worth while, even if it does reflect somewhat on hospitals and the medical profession. First and last, it all comes down to an adequate checking up of the patient's complaint, by careful methods of examination, including the x-rays, as well as careful consideration of the history of the accident.

Practically all of these persistent back disabilities of the severer type are the result of falls, —from 10 to 60 feet,—and careful questioning will bring out certain mechanical features in regard to the position of the patient's body at the time of impact, which may go a long way towards making a correct diagnosis.

Simple back strains from lifting and bending are generally of short duration, and do not lead to dispute, for the periods of disability are short. This paper, then, will be largely a discussion of the question of diagnosis in cases of compression fracture of the spine, and therefore, before going further, it will be necessary to go into detail somewhat as to what constitutes a compression fracture, its method of production, the nature of the accident, diagnosis, the subsequent course, and the question of long-continued or permanent disability.

* Read before the Fourth Annual Meeting of the International Association of Industrial Accident Boards and Commissions, Boston, Mass., August 22, 1917.

Definition of Compression Fracture.

A compression fracture of a vertebra is one where the body of the vertebra is crushed or flattened evenly, or more on one side than the other, and often more in the anterior portion than the posterior, depending on the direction of the application of the crushing force. As a rule, they are more compressed or crushed in their anterior portion than in the posterior.

Methods of Production.

Compression fractures of the vertebrae generally follow severe violence, applied through the long axis of the spine, or while the spine is forcibly flexed. Falls on the buttocks, shoulders or back, or landing on the feet from a height, combined with forcible flexion of the spine, are the most frequent causes.

Nature of Accident.

In an analysis of the cases which have been examined by me the following accidents caused compression fractures, either in one or more vertebrae in the same individual.

TABLE I.

1	Fell 23 ft. Landed on feet.	2nd and 3rd lumbar crushed	Kyphos
2	Caught under electric car, back forcibly flexed.	5th lumbar crushed	Kyphos 1st to 3rd lumbar
3	Fell 50 ft. from a tree. Landed on back.	2nd lumbar crushed	
4	Jumped from burning building.	Fracture 4th lumbar	
5	Thrown from motor. Landed on buttocks.	Fracture 4th and 5th lumbar	
6	Struck on back by planks falling off roof.	Fracture 1st and 2nd lumbar	Kyphos
7	Fell 12 ft. Landed on back.	Fracture 1st lumbar	
8	Fell 45 ft. on to a concrete floor.	Fracture 12th dorsal, 1st and 4th lumbar	
9	Walked out of 2nd-story window in sleep; fell 15 ft.	Fracture 12th dorsal, 1st and 2nd lumbar	Kyphos 12th dorsal to 1st lumbar
10	Fell 30 ft. Landed on buttocks.	Fracture 1st lumbar	
11	Run over by heavy truck.	Fracture transverse processes of 4th lumbar vertebra	
12	Fell 17 ft. Landed on back.	Fracture 1st lumbar	Kyphos 1st lumbar
13	Run into by second-hand Ford.	Fracture 4th lumbar	
14	Fell 14 ft. down elevator well. Landed on buttocks.	Fracture 2nd and 3d lumbar	Kyphos, slight
15	Fell with staging 50 ft.	Fracture 11th, 12th and 9th dorsal, and 1st lumbar	Kyphos, 9th and 10th dorsal
16	Fell with staging 40 ft.	Fracture 12th dorsal, 1st lumbar	
17	Fell 27 ft. Landed on back.	Fracture 1st lumbar	Kyphos, 1st lumbar.
18	Fell with staging 40 ft. Landed on feet.	Fracture 12 dorsal, 1st and 2nd lumbar	Kyphos, 12th dorsal
19	Fell 15 ft.	Fracture 1st and 2nd lumbar	
20	Doubled up under wagon.	Fracture 1st lumbar	Kyphos
21	Fell 12 ft.	Fracture 1st and 2nd lumbar	Kyphos, 12th dorsal
22	Fell 10 ft. through hole in stairway.	Fracture 1st lumbar	Kyphos
23	Bag of flour fell on back.	Fracture 1st lumbar	Kyphos

Here is concrete evidence that falls will and do cause fractures of the spine, without, in many cases, other symptoms than that of a lame and stiff back.

It will be noted that almost twice as many fractures took place at the level of the first lumbar vertebra than at any other location. This is probably due to the fact that the center of greatest mobility of the spine is at that point, and that also it is an area not very well guarded except by muscles, which do not offer the protection that is offered to the dorsal vertebrae by the ribs. (See Table II.)

TABLE II.

LOCATION OF FRACTURE	INDIVIDUAL VERTEBRAE AFFECTED
9th dorsal	1
10th dorsal	2
11th dorsal	1
12th dorsal	6
1st lumbar	14
2nd lumbar	8
3rd lumbar	2
4th lumbar	4
5th lumbar	3
	41

That the fractures are not limited to one vertebra in any single case is evident by the fact that only eleven cases out of twenty-three showed that one vertebra alone was injured; seven showed that two vertebrae were fractured, three had three vertebrae fractured, and two had four vertebral bodies fractured.

Certain cases showed a deformity of the back as a result of the bony destruction known as a kyphos—a backward bowing at the point of fracture, due to a collapse of the vertebral body. This knuckle or kyphos is not a constant factor, but may result from the fracture of one or more bodies. It is a diagnostic point to bear in mind, and means, of course, only one thing, namely, destruction or distortion of the vertebral body. About 50% of the cases showed this deformity, coming apparently in those cases where the fracture was located near the dorso-lumbar junction. The kyphos may not make its appearance

at once, following an injury, but may appear and increase somewhat during the convalescent period, when the individual is up and about, especially when without proper back support.

Symptoms.

The interesting thing about these cases, and probably the reason why so many of them are not diagnosed at first, is that they complain only of a stiff and painful back, with, generally, tenderness over the site of the fracture. Very few of the cases have any symptoms due to nerve pressure, and manifested as loss of sensation or paralysis of the legs, or incontinence of the bladder and rectum, which are always seen in cases of complete fracture of the back where the spinal cord is crushed. This lack of nerve involvement is probably due to the fact that the spinal cord ends at about the level of the first lumbar vertebra, the point of greatest frequency of fracture, and so escapes injury. Edema and hemorrhage about the cord may lead to temporary paralysis from pressure, but the symptoms from this condition usually clear up soon.

Practically all cases complain of a stiff, lame and painful back. They cannot bend freely and are more limited in side bending than in forward bending. Without treatment, that is, support to the spine, they go along complaining of the same conditions without relief until the fracture is discovered. Their disability at first is generally complete, but as time goes on they are able to be up and about, but not able to do heavy work.

TABLE III.

Date of Accident	Diagnosis Made by X-ray	Treatment before Diagnosis	Treatment after Diagnosis
July, 1910	5 months	None	
Oct. 7, 1914	6 months	Backbrace	Backbrace
June 24, 1914	1 year	Belt for last 4 months	Backbrace
Feb. 18, 1915	4 months	None	Jacket
Mar. 28, 1915	4 months	None	Backbrace
Apr. 2, 1915	6 months	None	Backbrace
Apr. 28, 1915	3 months	None	Brace
Sept. 27, 1915	At once	None	Bed
July 31, 1916	4 months	None	Jacket and Brace
Dec. 26, 1916	3 weeks	None	Corset
Feb. 14, 1914	1 month	None	Belt
Aug. 16, 1915	At once		Jacket
Dec. 27, 1915	2 months	Bed	Brace
Nov. 26, 1915	4 months	None	?
Apr. 30, 1916	3 months	None	Brace
Jly. 31, 1914	At once		Frame and Jacket
Oct. 31, 1912	3 months		Brace
Oct. 19, 1915	3 months		Jacket
Sept. 24, 1915	4 months		?
Nov. 6, 1916	3 months		?

Average: four months

It might be of interest to you to learn that an analysis of 17 of the cases showed that no diagnosis was made of the fracture at an average of four months from date of the accident. Several cases went five and six months, and one a year, before a diagnosis was made. This is not because the diagnosis is at all difficult to make, but simply because reasonable and due care is not used in the examination of the patient. It is certainly striking, and makes one think that the seeker after compensation is not always in the wrong, or that his symptoms are not always so subjective that they cannot be pinned down to some adequate anatomical defect. (See Table III.)

In regard to some of the graver symptoms accompanying these fractures, certain of the cases showed definite signs of injury to the spinal cord, manifested by loss of sensation in one or both legs, not complete, and more or less paralysis either early or late. Some of the cases which showed early loss of muscular power recovered it wholly, others have suffered permanent damage to the cord from pressure of the injured vertebrae, and will always have some paralysis of the legs.

Two of the worst cases, which showed paralysis from the first, are rather interesting. One was treated for pleurisy with effusion, or rather told that he had it, but was not treated, and no examination of his back was made, and the other was treated for hysteria in a hospital for seven weeks, meanwhile suffering from urinary retention and paralysis of both legs, and no examination was made of her back until the end of that time, when an x-ray was taken which, she was told, showed nothing.

The treatment, of course, in all these cases should be adequate fixation of the spine, in a plaster jacket at first, and later by means of a backbrace. The whole period of treatment will probably cover a period of several years. The question of an operation on the spine, designed to furnish support to the crushed vertebrae, has been considered and, I believe, has been done in some cases. The usual type of operation is that which uses a bone splint from the tibia inserted into the spinous processes. This procedure may shorten the period of convalescence somewhat, and may lead eventually to a somewhat stronger back in certain cases. Enough data have not been collected, however, to enable me to state definitely whether this operation should be used as a routine in all cases. As the callus forms about the fracture the spine loses its resilience and becomes stiff, especially to side bending, but the weakness and some soreness persist, especially after exertion such as walking, bending, or lifting. It is obvious that these individuals are totally disabled from further heavy work. There may be exceptions to this statement, but it is a good rule to go by, that once a laborer has had a compression fracture of the spine, he had better begin to look for some other kind of a job. The sooner he gets light work the better it is for him and for the insurance company; and here I might add that

the sooner the insurance company takes an intelligent interest in the after-treatment of these industrial accidents, the better it will be for them and for the injured parties; for these reasons, *i.e.*, by seeing that, first of all, a diagnosis is made and then proper and competent after-treatment is carried out, with as frequent medical attention as is necessary. This may seem to be an addition to the already heavy medical expense they all claim they are under, but such a course would soon pay for itself and become a profit, if put in the proper hands, and would eventually show a marked reduction in compensation allowances. Men would get back to work much sooner and would not drift about, as many do now, with little or no treatment, and continued inability to work, because of their lack of treatment.

CASE HISTORIES.

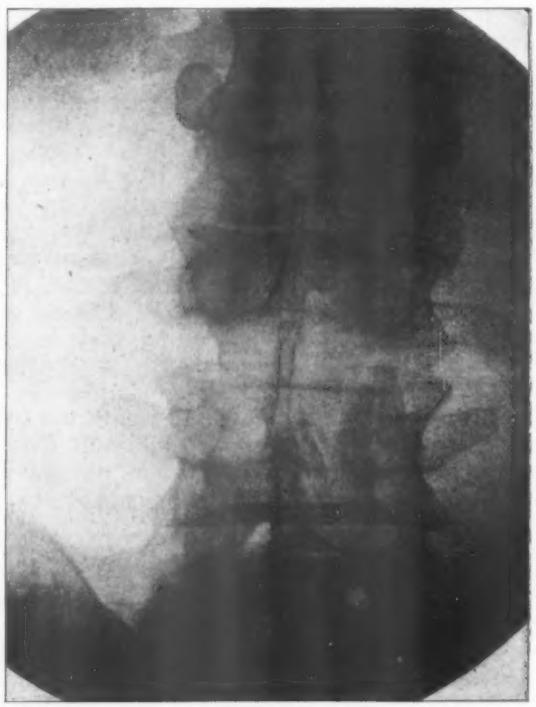
The first 11 cases in this series have been reported in detail in two previous publications by the author[1] and may be consulted there. The rest of the cases will be reported in detail here in order as shown in Table I.

CASE 12. Seen Nov. 17, 1916. J. S., male. Fell 17 feet when a ladder broke, July 31, 1916. No leg paralysis; bladder and rectum not involved. For first 2 weeks after injury was treated by having back strapped. Then had high frequency applied for "neuritis" for several weeks without benefit. No further treatment until November, 1916, when back was x-rayed and a plaster jacket applied, which was worn 3 weeks. He complains of pain in the back, especially on stooping, and is unable to lift anything. Was in bed at first for 3 weeks. Following removal of jacket, wore a narrow canvas belt around hips. Examination of back, made June 2, 1917, shows that he had a small kyphos in the region of the 12th dorsal and 1st lumbar vertebrae. He bends forward pretty well, but his back is stiff in bending in other directions. His nervous reflexes are normal, and he has no loss of sensation over any skin areas. The x-ray shows a compression fracture of the body of the 1st lumbar vertebra. This man was later fitted with a proper spring backbrace and was seen again in August, 1917, when he had improved sufficiently to do light work. His back still got tired and the kyphos still existed. His disability, of course, is permanent.

CASE 13. H. H., male, 47. Struck in back by the mud-guard of a motor car and thrown across a garage. He was able to go home, and later had his back strapped, which gave him some relief. Has pain in the back all the time, low down, but does not go into legs. Never had any paralysis or loss of sensation. The pain does not keep him awake, and he can lie on his back better than he can on his side. Comfortable when sitting down, but goes up and down stairs only with difficulty. Been unable to work since accident three weeks ago.

Examination shows that his back is tender and sensitive in the middle line low down. He is stiff in bending in any direction. The sensation is normal, except that there is some hyperesthesia over the buttocks and upper sacral region. The knee jerks are normal. An x-ray showed that there had been a fracture of the left-hand upper corner of the 5th lumbar vertebra, and a partial crush of the right side of the body of the 4th lumbar. There was also a slight lateral displacement of the whole spine above the 5th lumbar.

This injury was the result of a direct violence, and was completely disabling as far as his ability to work went. A heavy canvas corset was made for him, which he has been wearing now for about 7 months with great relief. He is able to do most of his usual work except heavy lifting. He has to wear the corset night and day, and still has a stiff, and occasionally painful back.



CASE 14, X-RAY No. 1. Shows a crush fracture of a 2d and 3d lumbar vertebra, the 2d lumbar being crushed more on the left side than on the right. There is obliteration of the intervertebral space between the 2d and 3d, and there is also callus formation, particularly on the right, between the bodies of the 2d and 3d.

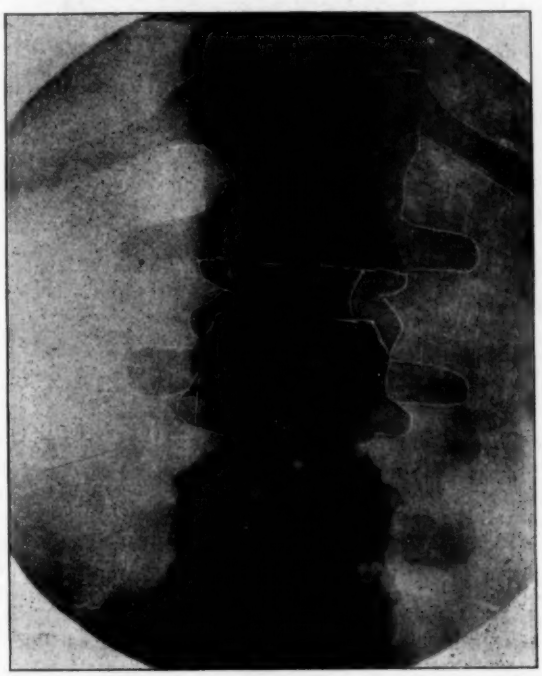
CASE 14. H. M., male, 44. Accident Feb. 14, 1914. Examined May 5, 1917. Fell down an elevator well, a distance of about 15 feet, and landed sitting down. He was taken to a hospital, where he stayed a few hours and had no treatment, going home later on the electric cars. He was in bed for 5 weeks, during which period his back was strapped. He never has had any paralysis or loss of sensation. For the last year or so he has worn a canvas belt, which makes him more comfortable. He complains of pain and weakness in the back, and thinks that the condition is not better than after the accident. There are some days when he is free from pain, but when he has it, it is localized in the small of the back. He is able to do light farm work, but cannot lift, or saw wood, and has been unable to go back to his previous occupation as a meat-cutter. Examination shows that he is a well-developed and nourished man, who walks normally, and has a rather short, broad back. There is a small kyphos in the lumbar region about the level of the 2d lumbar vertebra. His back is not stiff, and he

can bend fairly well in all directions. An x-ray shows that he has had a crush fracture of the 2d and 3d lumbar vertebral bodies, the second being crushed more than the third.

Here is an individual who has gone about for three and a half years with no more support than a light canvas belt, to partly hold a fracture of two vertebral bodies. He has done pretty well in spite of this, but should have had a jacket or back-brace. With better support he would even now be able to do more work. He is, of course, permanently disabled. (See X-ray No. 1.)

CASE 15. J. B. W., male, 44. Accident Aug. 16, 1915. Examination March 14, 1916. This man fell with a staging a distance of about 50 feet. He was made unconscious and does not know how he struck. He was in a hospital for over 3 weeks, where he had a plaster jacket applied, which he wore only a week. Since then he has worn nothing to support his back except a narrow canvas belt. He was in another hospital, a large metropolitan one, for 2 weeks, some time later, where he had no treatment, but had a number of x-rays taken for purposes of diagnosis. The first week following the accident, he had to be catheterized, but since then has had good control over bladder. He complains of weakness in both legs, and both legs feel as if they were asleep. He cannot stand well without support, and has a double toe drop. Examination shows that he walks with rather an ataxic gait. Both feet show no muscle power except very slight in toe flexors and moderate in gastrocnemius. The other leg muscles are of good strength. Double ankle clonus and knee jerks much exaggerated. No Babinski. Sensation to pin prick somewhat diminished over lower third of both legs. The back shows a kyphos in the region of the 9th and 10th dorsal vertebrae, not tender. The back is stiff and he cannot bend easily on account of loss of control of the legs. An x-ray shows that the 9th dorsal vertebra is crushed rather evenly and symmetrically. The 10th dorsal is apparently uninjured; the 11th, 12th dorsal and 1st lumbar vertebrae are crushed, especially the 12th dorsal, which is markedly flattened and displaced laterally. In the low lumbar region the intervertebral space between the 4th lumbar and 5th lumbar is partly obliterated, but no fracture can be made out. This man obviously has a permanent disability. The cord injury is slight, considering the number of vertebrae injured. The lack of treatment is not unusual, and he would be better with proper support. He will never be able to do much of anything in the way of work, except what can be done sitting down.

CASE 16. C. B., male, age 38. Accident Dec. 27, 1915. Examined March 1, 1916. This man fell about forty feet when a staging he was on collapsed. He was made unconscious and was taken to a nearby hospital. He had no trouble with his bladder or rectum, and could move his legs from the first, but stated that it hurt him to do so. He stated that he landed on his feet when he fell and became unconscious. In the hospital he had some x-rays taken of his back, which, he was told, was uninjured and that the x-rays showed nothing abnormal. He stayed in bed in the hospital for about 30 days and then went home. He had no treatment for his back. Since going home he has been up and about, although he has had to use a cane, on account of pain and swelling in his legs. He has not been able to go back to his work as a plasterer. Examination showed that his back was very stiff and tender. There was a slight kyphos in the dorso-lumbar region. The knee jerks were increased and he had a slight ankle clonus on the right and one more marked on the left. The sensation was normal. An x-ray of the spine showed a crush fracture of the 12th dorsal and 1st lumbar vertebrae, with a question of injury to the 2d lumbar. At this time he was wearing no support for the back and had never had any. This man was seen again a year later. He was still unable to work, on account of pain in the back. His legs are not strong and he has to walk with a cane, but can get about better than he could a year ago. He is now wearing a corset which he got through some magazine advertisement, in spite of the fact that he is also receiving back exercises at a large orthopedic clinic. His knee jerks are now normal and the ankle clonus has disappeared. (See X-ray No. 2.)



CASE 16, X-RAY NO. 2. Shows a crush fracture of the 12th dorsal and the first lumbar vertebra, the bodies being jammed directly into each other. The 2d lumbar is asymmetrical and has probably also been crushed slightly. There is considerable new bone formation about the sides of the 12th dorsal and first lumbar.

CASE 17. J. P., male, age 28. Accident Nov. 26, 1915. Examination, March 29, 1916. This man was working on a pile driver, when he fell 27 feet and injured his back, and, also, at the time of the accident his fall was broken somewhat by a cross-bar, which struck him across the back. He also broke his left leg at the ankle. He was taken to a hospital and a cast was put on the leg, but he had no examination or treatment for his back. Since leaving the hospital he has been at home, unable to work on account of pain in the back and disability in the ankle. Examination of the back shows that it is very flexible. There is a small kyphos on standing at about the 11th dorsal vertebra. His nervous reflexes are normal. An x-ray showed a fracture of lamina of the 1st lumbar vertebra with displacement downward of the distal

ends of the lamina and its attached spinous process. This man's back was not his principal difficulty, but it is interesting that he never has had any treatment for it and has been able to get about without much discomfort.

CASE 18, X-RAY No. 3. Shows a fracture of the 12th dorsal, 1st and 2d lumbar. Note the squashing of the first lumbar with the new bone formation around its sides. There is also considerable spur formation or lipping on the edges of the other lumbar vertebrae.

CASE 18. F. G., male, 45. Accident April 30, 1916. Examination Feb. 10, 1917. This man fell about 40 feet when a scaffolding gave way. He landed on his feet, and was then bent forward violently, his knees coming in forcible contact with his ribs. He was laid up in bed at home for 6 weeks, not able to get up because of pain in the back. He has never had any trouble with his bowels or difficulty in passing his water. Has never had any loss of power in his legs or loss of sensation. Sometime in July, 1916, he went to the Massachusetts General Hospital, where he was fitted with a backbrace, which he has worn more or less ever since. This has given him some comfort and relief from pain. For the last 4 months he has been having massage and manipulation for his back by his own physician. He stated that he was getting better slowly, and was able to do chores around the house, but was not able to go back to his usual work as a laborer, on account of the persistent pain and weakness in the back. Examination showed that his back was flexible to forward bending without pain, but that side-bending was stiff and much restricted and caused pain. There was a small kyphos in the region of the 2d lumbar vertebra. The legs and nervous reflexes were normal. The x-rays showed a severe compression fracture of the 1st lumbar vertebra, possibly involving also the last dorsal and the 2d lumbar. There was considerable callus formation about the site of the fracture, which is not unusual and has been noted in some of the cases previously reported. This man was getting fixation by means of a brace, which was what he needed, part of the time, and then he was getting forcible manipulation every day, which was what he did not need. Rest and fixation do more good than active treatment and are a sure way to relieve pain. (See x-ray No. 3.)

CASE 19, X-RAY No. 4. Shows a crush fracture of the 1st and 2d lumbar, with marked callus formation and obliteration of the intervertebral space, the callus being more marked on the right side.

CASE 19. T. F., 40, longshoreman. Accident July 31, 1914. Examination Jan. 28, 1916. This man fell 15 feet and landed on his left hand and hip. He sustained a fractured wrist and injured his back. He was taken to a hospital, where he was kept on a Bradford frame for about 5 weeks and then wore a plaster cast for 6 weeks, since when he has worn a corset. At first, following the accident he stated that he could not move his legs, and this condition continued for about 4 weeks. Whether this was due to actual paralysis or not, I do not know. As he had no loss of sensation and no loss of control of the bladder or rectum, I question the existence of actual nerve injury. He has been able to do no work since the accident, and felt that he was not getting any better, or his back any stronger. He stated that the back gets lame and stiff, and that he always gets a backache while sitting down. He is more comfortable lying down flat on his back.

Examination shows that he has a fairly flexible back. The movements were rather guarded. There was no kyphos. His reflexes were normal. An x-ray showed that he had sustained a crush fracture of the 1st and 2d lumbar vertebrae. The right side of the 1st lumbar was broken, and the 2d lumbar was crushed down on itself evenly. There was considerable new bone deposited about the two vertebral bodies, especially on the right side. This man has, of course, a permanent disability,

which will prevent him from ever doing his usual work as a longshoreman. An interesting thing about the case, from the point of view of diagnosis, was that previous x-rays, taken since he left the hospital, were interpreted as showing no bone injury. (See X-ray No. 4.)

CASE 20. D. McC., 51, teamster. Accident, Oct. 31, 1912. Examination May, 1916. This man had the true mechanical factors in his accident to produce the typical flexion fracture. He was caught under the front of an empty team, and in attempting to stop it, put his feet against the front axle and pushed. The team was heavy and doubled him up, as he lay on the ground on his back. He was taken to a hospital and kept on a Bradford frame for 3 weeks. X-rays taken at that time, he stated, showed no abnormality. He was discharged from the hospital at his own request Nov. 29, 1912. He was then treated by his own physician, by sticking plaster strapping. Later, early in 1913, he had a backbrace applied, which he has worn since and which he stated he could not do without. He has never had any signs or symptoms of cord pressure. He complained of pain and soreness in the back, and consequent inability to work.

Examination showed that while standing he was somewhat tender in the dorso-lumbar region, and that there was a slight kyphos which could be felt at the dorso-lumbar junction. He could bend forward freely, but could not bend very well to the side. An x-ray examination showed a fracture of the 1st lumbar vertebra, with an obliteration of the space between the 1st lumbar and 12th dorsal, with some callus formation. This man will be unable to do his usual work as a teamster, and should get some sort of light work to do instead of drifting about, doing nothing, which is demoralizing physically and morally.

CASE 21. D. C., male, 39, plasterer. Accident Oct. 15, 1913. Examination, Oct. 30, 1916. This man fell a distance of 12 feet on to some stones. He does not know how he landed. He was taken to a hospital, where he stayed 9 days, but had no treatment. He was told an x-ray of his back taken there showed nothing abnormal. After leaving the first hospital he went to another, where another x-ray was taken and a plaster cast applied to his back. This he wore about 10 months. This was followed by a backbrace which he is still wearing. He has been unable to do any work since the accident on account of pain in the back and some weakness. He is unable to get about without some sort of back support, such as the backbrace given him.

Examination shows that the back is rather stiff in bending. There is a moderate kyphos in the region of the dorso-lumbar junction, involving apparently one or two vertebrae. He stands with rather a rounded back, protuberant abdomen and flat chest. His sensation and reflexes are normal and apparently always have been—another case with total disability for heavy work. An x-ray showed that he had sustained a compression fracture of the 1st and 2d lumbar vertebrae. The 2 bodies are jammed together with a consequent obliteration of the intervertebral space.

CASE 22. Wm. C., male, 42. Accident Sept. 24, 1915. Examination Feb. 26, 1916. This man stepped through an incompleted stairway in the dark and fell about 10 feet. He landed on his back. He was taken to a large hospital where he stayed 4 hours. While there his back was x-rayed and he was told that there was nothing the matter. His back was strapped and he went home. He was laid up at home, but not in bed, for 7 weeks, and did not go back to work for two reasons: (1) that his back hurt him, and (2) that he could not get anything to do. He complains of pain in the back now, localized low down in the region of the sacrum. This pain is better some days than on others. He has some pain and discomfort when getting in and out of a chair.

Examination showed that he could bend his back well forwards and sideways. There was a small projection backward of the spine in the region of the dorso-lumbar junction, which was tender. X-rays of the spine showed that there was a flattening and crushing of the body of the 1st lumbar vertebra, with some callus laid down between it and the 12th dorsal vertebra above, and the 2d lumbar below. There was an obliteration of the intervertebral space between the 1st and 2d lumbar vertebrae. This man had a not very severe fall,—few symptoms following, except backache,—and expresses a willingness to go to work, yet he has had a fracture of one of his vertebral bodies. He has also been without any real treatment since the accident. I believe that many of the unexplained backaches following falls and injuries of various sorts, which heretofore have been called "railway spines," "neurasthenic spines," and "traumatic spines," may have well been fractures of the vertebral bodies of this type.

CASE 23, X-RAY NO. 5. Shows compression fracture of the 1st lumbar vertebra. Note the body of the first lumbar is about half the thickness of other bodies.

CASE 23. S. A., male, 29. Accident Nov. 6, 1916. Examination July 30, 1917. This man stated that a bag of flour fell from a height on to his

back, as he was stooping over. After the accident he was taken to a hospital, where his back was strapped, and he was kept in bed for 17 days, at the end of which time a plaster jacket was applied. This he wore for 32 days. No x-rays were taken there, but he had some taken in Boston February, 1917, which were reported as negative. He has been without support to his back since the plaster cast was removed. He complains of considerable pain and weakness in the back, more marked when walking around and when trying to lift anything than when sitting or lying down.

Examination shows that his back is flexible to all motions, but that he complained of pain in side bending. There was a small kyphos at the 1st lumbar vertebra. There was no evidence of any nerve involvement. An x-ray showed that he had sustained a crush fracture of the 1st lumbar vertebra. (See X-ray No. 5.)

This man has a permanent disability which will prevent him from doing any heavy work in the future. He needs a support of some kind for his back, which will give him more comfort than he now enjoys.

X-RAY No. 6. Shows a lateral view of a compression fracture of the 9th dorsal vertebra, the result of an automobile accident. There were no symptoms of nerve pressure in this case; there was a small kyphos in a girl of about twenty. Used by permission of Dr. R. W. Lovett.

Now what conclusions does a study of a group of cases like these lead one to arrive at? In my own mind, they are as follows,—namely, that, first of all, the necessity and value of a diagnosis is demonstrated; and, second, that few cases get a careful and adequate examination.

1. Compression fracture of one or more vertebral bodies is not uncommon, following falls on the feet or back, or following the dropping of weight directly onto the flexed spine.

2. The fracture is generally the result of forcible flexion of the spine.

3. There usually is no nerve involvement or cord pressure.

4. The injury results in a weak, stiff and painful back.

5. The examination of any back case, especially following an injury, is always incomplete without a good x-ray.

6. There is usually a kyphos present, not always appearing at once.

7. The disability for heavy work is usually permanent.

8. That in so far as the majority of cases is concerned, they go unrecognized as fractures of the vertebral bodies, because of inadequate examination, and consequently continue to suffer pain and disability, which is real and not feigned.

9. No individual who complains of pain, soreness or stiffness in the back, following an injury or fall, should go without careful examination of the back.

To quote from one of my previous papers in regard to the prognosis:[2]

"The bony repair is generally good in these lumbar cases, and although there may be a persistent stiffness, the supporting function of the spine is generally good, even in spite of a kyphos, which may tend to increase somewhat. Permanent disability, so far as doing heavy laborious work goes, generally follows such an injury, and as a rule a light backbrace is needed for some time, or always, to give comfort and stability. The prognosis, as far as life is concerned, is generally excellent, provided no cord injury has occurred."

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STUDIES OF INFANT FEEDING.

IX.

THE AVAILABILITY OF DICALCIUM PHOSPHATE WHEN PRESENT AS A CONSTITUENT OF INFANTS' FOOD.

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INTRODUCTION.

ONE of the striking differences brought out by the comparison of the analyses of the feces of breast and bottle-fed babies is in the amounts of insoluble inorganic phosphorus found,—feces from breast-fed babies having from 0 to 0.06 grams of P_2O_5 per twenty-four hours, while the feces from bottle-fed babies will show amounts depending upon the quantity of cow's milk fed; sometimes being as high as 1.0

gram P_2O_5 per twenty-four hours. We have determined that this insoluble inorganic phosphorus is present in the form of calcium phosphate. Now, as it has been shown that insoluble dicalcium phosphate is present in suspension as a normal constituent of cow's milk,[1] and is not a constituent of breast milk,[2] the question arose as to whether the large amounts of phosphates present in the feces of bottle-fed babies are due directly to the insoluble phosphates present in the cow's milk used, or to other causes. The investigation reported here was undertaken in order to ascertain if dicalcium phosphate is available as a food when present as a constituent of infant's food.

Our results seem to indicate that children over four months old can use a small part of the dicalcium phosphate, while younger infants cannot utilize any of it. This finding would seem to have special significance in connection with the use of limewater in infant feeding, as we have shown[3] that the addition of limewater to milk results in a precipitation of insoluble calcium phosphate, brought about by a chemical reaction which may be expressed as follows:

$$CaCl_2 + 2\ NaH_2PO_4 + Ca(OH)_2 = 2\ NaCl + 2\ CaHPO_4 + 2\ H_2O.$$

It is possible, by the addition of limewater in quantities no larger than are commonly employed in infant feeding, to reduce the soluble calcium and phosphorus in modified mixtures of cow's milk to amounts less than those found in breast milk. We believe this fact may have a direct bearing upon certain abnormalities found in connection with infant feeding.

EXPERIMENTAL.

I.

Metabolism studies with synthetic milk containing no inorganic salts.

In order to control all factors entering into the composition of our food, it has been necessary for us to use a synthetic milk. This milk is made from pure butter fat, lactose, sodium caseinate and distilled water, according to the method already published by us.[4] In order to show that such a milk, which contains only the organic constituents named, none of the salts ordinarily found in milk being present, is readily digested and absorbed, and also to show the amounts of calcium and phosphorus eliminated in the feces when such a milk is fed to infants, we give figures from two metabolism periods with such a food. For comparison, we also give data obtained while these children were also receiving modified cow's milk.

The figures in Table I bring out several interesting and important points, among which may be mentioned the small amounts of dry feces, fat, phosphoric acid and calcium eliminated while the synthetic milk was being fed. The decrease in the fat elimination we shall consider in another paper. The small amounts of phosphoric acid and calcium eliminated when the synthetic food was fed are of importance in connection with the subject of this paper, in that, with this knowledge at hand, we are enabled to make quantitative measurements of the amounts of calcium phosphate eliminated in the feces when this salt is added to synthetic milk similar to that used in obtaining the above data.

II.

Metabolism studies with synthetic milk containing sodium caseinate and no inorganic salts other than dicalcium phosphate, $CaHPO_4$.

As it was quite possible that the presence of fat might have some bearing on the question involved, we have fed dicalcium phosphate ($CaHPO_4$) in synthetic milk, both with and without fat. The data obtained would indicate that the presence or absence of fat in the food is not a factor in the problem under consideration.

TABLE I.—ELIMINATION OF CALCIUM, PHOSPHORIC ACID AND FAT WHEN INFANTS RECEIVE SYNTHETIC MILK CONTAINING NO INORGANIC SALTS.

KIND	FOOD					URINE			FECES				
	AMT. INGESTED	FAT	SUGAR	PROTEIN	P_2O_5 IN CASEIN	VOLUME	P_2O_5	CaO	DRY WEIGHT	FAT	NITROGEN	P_2O_5	CaO
		GRAMS	GRAMS	GRAMS			GRAMS	GRAMS					
No. 70. 5 WEEKS													
Modified cow's milk 2-6-1-6*	795	15.9	47.7	12.72	—	570	.342	.025	10.80	5.53	.42	.586	1.672
Synthetic milk 2-6-1.6.....	795	15.9	47.7	12.72	.204	550	.264	.000	1.51	.40	.10	.047	.013
	795	15.9	47.7	12.72	.204	440	.229	.000	1.58	.39	.10	.032	.013
	795	15.9	47.7	12.72	.204	470	.235	.000	3.68	.73	.28	.039	.029
	795	15.9	47.7	12.72	.204	490	.200	.000	3.76	.74	.27	.043	.018
Daily Average.....									2.63	.56	.19	.040	.018
No. 101. 6 MONTHS													
Modified cow's milk 3-6-1.5	1200	36.0	72.0	18.00	—	560	.414	.032	6.94	4.34	—	.121	.934
Synthetic milk 3-6-1.5.....	1200	36.0	72.0	18.00	.288	550	.313	.013	3.09	.66	.22	.007	.012
	1200	36.0	72.0	18.00	.288	500	.270	.013	2.47	.48	.18	.017	.010
	1043	31.3	62.6	15.70	.251	540	.231	.013	2.65	.53	.16	.035	.010
Daily average.....									2.74	.42	.19	.020	.011

* Fat 2%, sugar 6%, protein 1.6%.

Age seems to be a factor, however, for it will be noticed that the older children have apparently utilized considerable of the phosphate.

During these investigations, the amounts of food ingested were recorded and the urine and feces were collected in twenty-four hour amounts. The feces at the beginning and end of the periods were marked off with carmine red. Powdered agar was added in some cases to increase the bulk of the feces and help to overcome constipation, which frequently results when a salt-free milk is fed to infants for more than one or two days. This agar contained 1.1% of CaO, and explains the excess of calcium in the feces above that required to give the theoretical amount to combine with the P_2O_5 to give dicalcium phosphate.

The data obtained from the analyses of the urine are similar in all respects to those given in Table I, and for this reason will not be given here.

The fat elimination in all cases showed the same decided drop from several grams per day on modified cow's milk to a gram or less when on synthetic milk.

Table II gives the amounts of calcium oxide and phosphoric acid, P_2O_5 fed as $CaHPO_4$, and the amounts recovered in the feces.

TABLE II.—CALCIUM AND PHOSPHORUS METABOLISM WHEN INFANTS RECEIVE SYNTHETIC MILK CONTAINING DICALCIUM PHOSPHATE.

Age	2.5 Mos.	3 Mos.	4 Mos.	4 Mos.	4 Mos.	8.5 Mos.	2 Mos.
In Food							
Fat	0	3%	0	3%	3%	0	3%
Grams CaO in $CaHPO_4$	1.044	1.332	0.999	1.430	1.432	0.748	1.684
Grams P_2O_5 in $CaHPO_4$	1.323	1.688	1.267	1.798	1.820	0.948	2.136
In Feces							
Grams Fat	0.860	3.220	3.140	4.960		1.660	
Grams CaO	0.642	1.546	1.059	1.374	1.469	0.852	1.679
Grams P_2O_5	0.840	1.309	1.163	1.678	1.855	1.090	2.067
Per cent. $CaHPO_4$ assimilated	36.5	22.8	16.4	6.7	0.0	0.0	3.2
Length of Period	4 d.	4 d.	5 d.	4 d.	4 d.	4 d.	4 d.

III.

Metabolism studies with synthetic milk containing calcium caseinate and all the inorganic salts of cow's milk except the soluble calcium and phosphorus, together with some insoluble dicalcium phosphate.

While the experiments reported above show that, under the condition there given, the dicalcium phosphate is more available to infants six to eight months old than it is to younger infants, it does not tell us how available this same salt is when fed as a normal constituent of cow's milk; and in order to throw some light on this phase of the question, we have fed a synthetic milk made from butter fat, lactose, calcium caseinate, sodium caseinate, and a special protein free milk powder from which all the calcium has been removed.* The milk, as made from these materials, resembles modified cow's milk in all respects, except that, in place of the albumin of the cow's milk, we have used sodium caseinate. The object of this investigation was to determine what influence the calcium of the calcium caseinate will have on the assimilation of dicalcium phosphate. We give below the data in detail from one child eight months old.

The food fed during this investigation contained 3% fat, 6% lactose, 2.4% protein (1% sodium caseinate and 1.4% calcium caseinate), and 0.3% soluble salts of milk.

The period during which the $CaHPO_4$ was added to the synthetic milk was preceded by two days during which the child received no $CaHPO_4$ in the synthetic milk. This preliminary period was introduced in order to sweep out from the intestines any insoluble calcium phosphate derived from the modified cow's milk which the child had been receiving.

The $CaHPO_4$ was fed by placing 0.5 gram of this salt into each bottle of food fed to the child. All bottles containing any unconsumed food were saved, and the amounts of $CaHPO_4$, calcium as caseinate and P_2O_5 in casein remaining were determined. The $CaHPO_4$ was fed for four days, the urine and feces being carefully collected during this time.

TABLE III.—AMOUNT OF CaO AND P_2O_5 INGESTED AND EXCRETED WHEN SYNTHETIC MILK CONTAINING $CaHPO_4$ AND CALCIUM CASEINATE IS FED

	P_2O_5 Grams	CaO Grams
Ingested in four days		
In casein	1.722	1.582
In $CaHPO_4$	5.402	4.323
Total	7.124	5.905
Excreted in four days		
In urine	2.254	0.179
In feces	5.578	5.975
Total	7.832	6.154
Balance for four days	—0.708	—0.249
Average daily balance	—0.177	—0.062
Per cent. $CaHPO_4$ assimilated	0	0

The amounts of calcium oxide and phosphoric acid recovered are given in Table III. An examination of these figures will show that none

* Our method for the preparation of this protein-free and decalcified milk powder will be published later.

of the calcium phosphate was utilized by the child, and that more calcium and phosphorus were recovered in the feces than was fed as $CaHPO_4$, indicating that the calcium caseinate upon hydrolysis in the intestines had yielded calcium and phosphoric acid which had united to form insoluble calcium phosphate, the child thus eliminating more calcium phosphate than he received.

The excess of calcium in the feces over that required to form $CaHPO_4$ is present as calcium soaps,—a subject which will receive more detailed consideration from us in another paper.

IV.

The effect of feeding an excess of soluble calcium on the phosphorus metabolism.

We have shown in the preceding table that the calcium of the calcium caseinate may unite with the phosphoric acid formed by the hydrolysis of the casein molecule, the insoluble calcium phosphate thus formed being excreted in the feces. As a matter of interest in connection with another phase of calcium metabolism, we wished to know what influence an excess of calcium would have on the assimilation of the phosphorus of the casein molecule. For this investigation, a food was made which contained 2% fat, 6% sugar, and 2% calcium caseinate. The calcium caseinate was made by dissolving pure casein in limewater in the proportion of one grain of casein to ten cc. limewater. After the synthetic milk had been homogenized, some of a 10% solution of calcium acetate ($[CH_3COO]_2Ca.H_2O$) was added to it at the rate of 0.75 cc. per ounce of food.

The data obtained show that it is possible, by excessive calcium feeding, to precipitate all the phosphorus of the food in the intestines as insoluble calcium phosphate, thus reducing the phosphorus metabolism to such a low level that the urine becomes phosphorus-free and contains a large amount of carbon dioxide.

TABLE IV.—PHOSPHORUS METABOLISM WITH A SYNTHETIC MILK CONTAINING A LARGE AMOUNT OF SOLUBLE CALCIUM.

Food	24 Hours
24-hour amount	1200.0000
CaO in caseinate	.6048
CaO in acetate	.9540
Total CaO	1.5588
P_2O_5 in casein	.3840

	Urine			Feces	
Day	CaO	Cl	P_2O_5	CaO*	P_2O_5
1st	.0413	.228	.328	1.265	.275
2nd	.0842	.290	.094	1.210	.224
3rd	.0811	.049	.013	1.824	.340
4th	.0780	.000	.009	.705	.136
5th	.0722	.060	.017	.852	.198
6th	.1949	.298	.000	1.787	.410
7th	.1958	.112	.000	1.729	.393
8th	.2144	.068	.000	1.685	.459

* The excess of CaO is present as Ca soaps of fatty acids and as calcium carbonate.

CONCLUSIONS.

It has been previously shown by Van Slyke and Bosworth that cow's milk contains 0.175% of dicalcium phosphate ($CaHPO_4$), and in this paper it has been shown that this phosphate was not available as a food to children under four months of age, and only partly available to older children. This utilization of calcium phosphate by the older children is probably dependent upon the more abundant secretion of hydrochloric acid.

In connection with the results reported here, it is of interest to consider the fact shown by Bosworth[2]—that human milk, unlike cow's milk, contains no dicalcium phosphate, the mineral elements in human milk therefore being completely available as food for infants.

In calculating the amount of mineral elements present in modified cow's milk for use in infant feeding, the dicalcium phosphate should be considered as unavailable, and a corresponding deduction made from the total mineral elements in milk.

We have shown that during the process of digestion of calcium caseinate the calcium and phosphorus contained within the calcium caseinate may unite to form insoluble calcium phosphate and appear in the feces as such, the calcium and phosphorus balances under these conditions becoming negative.

We have also shown that by feeding a large amount of soluble calcium it is possible to precipitate practically all the phosphorus in the food as insoluble calcium phosphate, this substance being eliminated in the feces, and as a result of this the metabolism of phosphorus is reduced to such a low level that the urine becomes phosphorus-free.

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ANTHRAX AS AN OCCUPATIONAL DISEASE IN MASSACHUSETTS.

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HUMAN anthrax has suddenly become a serious industrial, as well as a public health problem in Massachusetts. Hides, skins, wool, bristle and other animal products that formerly went to Europe are today exported direct to the United States. A large quantity of these imports comes from places where animal anthrax is constantly epidemic, namely, China, Asia, India, Africa, South America and Australia. The number of cases of human anthrax reported to the State Board of Labor and Indus-

tries in Massachusetts has increased from four cases in 1914 to twenty-seven cases during 1915-16. There have been forty-six cases reported in 1917 prior to November 1. Eight of these cases have been fatal. Between the dates July 1, 1915, and November 1, 1917, there have been seventy-seven cases, with fourteen deaths.

Anthrax is primarily a disease of animals, from which it is contracted directly or indirectly by human beings. It is particularly common among cattle, sheep, horses, hogs and carnivora, in the order named. Domestic fowl (probably most birds) and the cold-blooded animals are not susceptible. Infection in the herbivorous animals takes place usually through food (fodder) or water containing anthrax spores. This food becomes contaminated by being grown on anthrax-infected soil, usually by the decaying of an unburied carcass, from which bacilli are spread by dogs, birds and insects. Superficially buried infected carcasses may contaminate surface soil by means of ground water or worms.

Anthrax may be transmitted to man by infected hides, skins, wool, horse hair, cow hair, goat hair, pigs' bristle or pigs' wool, as well as by dried blood, bones and other animal products. The bacillus of anthrax soon dies out when dried at the ordinary temperature, but the *spores* of the disease may remain active under favorable circumstances for many years. These spores, enclosed in blood clots, dry, and getting on the hair, skin or wool, are the usual source of infection, owing to the clots breaking up into dust. The dust from the handling, sorting and manipulation of the animal products readily finds its way into the lungs in breathing, or is swallowed in the act of eating or drinking. More often, however, the dust finds its way into broken skin by cuts, bruises or scratched pimples. The result of this infection is anthrax. Anthrax, therefore, is chiefly a dust disease. (It can be caused by eating diseased meat and by the bite of an insect which has fed upon infected carcasses or other material.) While the danger of anthrax is greatest, according to all statistics, in the manipulation of animal products imported from China, Russia and Siberia, nevertheless the disease is so widely distributed that in no country is it unknown. Consequently the precautions which are most necessary where hides, skins, hair and wool from the countries named are handled, can with advantage be applied to products from other countries. In the United States there is no interstate quarantine law against anthrax.*

The intestinal form of anthrax is rare in man and is caused by eating infected food (sausages) made from the meat of infected animals. This form of anthrax, however, is more apt to be due to eating with hands not properly cleansed after handling infectious material. Not infrequently it is due to swallowing with the saliva dust infected with anthrax.

Intestinal anthrax is very fatal and seldom diagnosed ante mortem. (See Case 1.)

The pulmonary form of anthrax is familiar in textbooks as "wool-sorters' and rag-pickers' disease." The mortality of this form of anthrax is about 50%.

The external form of anthrax is the common type met in industrial life. This may be malignant pustule form (see Case 9) or malignant edematous type (see Case 7) or erysipelatous (see Case 10).

The symptoms of external anthrax vary greatly in their severity and progress. The disease begins usually very mildly, with little or no pain, and is seldom noticed by the patient at the early stage. A red, hard pimple about the size of a pinhead forms, usually at the point of inoculation (usually a scratch). There may be itching and slight redness. The pimple rapidly increases in size and becomes vesicular, surrounded by a marked swelling, often of considerable extent, which gives it the name of anthrax edema. In the center of the pustule there is a black spot, discharging a bloody serum. Within thirty-six hours a dark brownish eschar forms. The black appearance of the pustule won for anthrax the French name of charbon. This stage is very characteristic of the disease. On the third or fourth day the lymphatic glands in the vicinity of the pustule are usually swollen and painful. In case of neck infection the inflammation may attack the larynx and endanger respiration. (See Case 4.)

The usual case of anthrax is uneventful—except the local symptoms. Severe attacks are marked by fever. In critical cases the patient complains of weakness, pain, and at times delirium ensues. If the bacilli get into the blood stream a condition of general septicemia occurs. The complete cycle of the disease takes from nine to ten days. Some cases are quickly fatal, other cases of anthrax escape notice until the eschar forms (characteristic) or are diagnosed post mortem.

In the external malignant edema form of anthrax, pustules may be absent (Case 7). The edema extends rapidly to eyelids, neck and arms. This may occur without redness, pain, distress or fever.

The internal form of anthrax is relatively rare. There are no characteristic symptoms and the diagnosis is a "surprise of the autopsy." (Case 1.)

In gastro-intestinal anthrax the course is usually one of sudden onset, with pain, distress and general weakness, followed by vomiting, colic, distention and diarrhea; later cyanosis, collapse, and at times tetanus-like convulsions precede death, which usually occurs from two to five days after onset of first symptoms.

Pulmonary anthrax (wool-sorters' disease) is characterized by extreme weakness, headache, profuse perspiration, dyspnea, cyanosis and

* The U. S. Bureau of Animal Industry requires a certificate from the Consul at the country of export, stating that the hides have been disinfected. Animal products imported without such certification are disinfected on arrival at the workshop or tannery.

edema of the lungs. This form lasts from four to eight days, but at times death is sudden and unexpected.

Human anthrax is usually of occupational origin, transmitted to the workers directly by animal products. Besides direct contact-infection by farm laborers, butchers, veterinarians and others handling diseased animals or their carcasses, the occupations most exposed to infection are those in which hides, skins, leather, wool, animal hair, bristle, horn, bone and dried blood fertilizer are handled.

The most notable instances of non-occupational anthrax are those associated with infection through shaving brushes in which the anthrax spores on the bristles survive the process of manufacture. Also cases of human infection by washing overalls worn by men in hide and leather industries have been reported.

The following are typical cases taken from the records of the Massachusetts State Board of Labor and Industries:

CASE 1. Internal anthrax—fatal. The daily papers reported that a man, age 50 years, employed as a 'longshoreman, died on the previous day at the hospital from arsenic poison, contracted from handling hides. Investigation furnished the following history:

Man entered the hospital in a moribund condition on July 4 and died within a few hours. The diagnosis was edema of the lungs, multiple contusions and abrasions. An autopsy was secured and the medical examiner's report stated as cause of death—"internal anthrax. The nature of the disease which caused W.'s death was disclosed only by autopsy. Investigation showed that on May 25 he worked in the hold of a vessel laden with dried blood, ground bones and phosphate, and subsequently to that date assisted in the discharge of cargoes of dried hides."

It was learned later that the man was taken ill on June 30 and was not able to work July 1. On July 3 he complained of headache, and on the morning of July 4 was found unconscious on the floor of his room. He was removed to the hospital and died at noon July 4.

CASE 2. External anthrax—wool infection. A boy, 16 years of age, employed as a sweeper in the weave room of a carpet mill, developed a suspicious-looking ulceration on the face, which on investigation gave a positive smear of anthrax and later developed a typical pustule. This boy worked in the machine shop and was also sweeper in the weave room, sweeping the "fly" of wool from the weaving machines and packing it into bags. The carpet is woven from jute and wool. The superintendent reported that the boy had been caught sleeping two or three times in the bags of wool. This wool came from South America principally.

CASE 3. External anthrax—fatal. Man, 31 years of age, employed as a tanner in the fleshing department of a tannery, developed a swelling of the right upper arm on November 20. Was admitted to the hospital on that day and positive diagnosis of anthrax secured. Case progressed to marked edema of the neck, with death on November 27.

CASE 4. External anthrax—fatal. Man, 33 years of age, employed as a currier in a leather establishment, was struck on the side of the neck with a piece of leather on March 4, scratching the skin. That evening he noticed considerable swelling surrounding the point of infection. The swelling spread during the night and next day to the neck and face with considerable tenderness of the whole left side of face, neck and chest. On March 6 swelling had extended to the chest. Smear showed positive anthrax. Man died on March 9.

CASE 5. External anthrax—multiple lesions—rare. Man employed in handling hides as they came from lime pits where they had been soaked for six days. He had worked at this occupation for three years, but had recently been assigned to the handling of a cargo of China hides. On August 9 complained of malaise, headache, general weakness and had some fever. On August 11 slight glandular enlargement of the neck. Visited a physician who discovered eight lesions on neck, cheek and forehead. all of which went through the typical stages of anthrax vesicles and pustule, giving a positive diagnosis of anthrax. Man stated that he had been uncomfortable for about thirty-six hours, otherwise no marked effects of the infection.

CASE 6. External anthrax—typical case. Man, twenty-four years of age, employed for three years in stamping raw hides. His duties consisted in lifting hides from floor, weighing them, and placing them on machines that stamped them. He does not admit having carried hides on shoulder or in contact with the neck. On March 20 he noticed small, tender pimple on left cheek. No history of previous scratch or pimple. Swelling grew very tender. Was admitted to the hospital March 20; symptoms of slight sore throat, stiffness of left side of neck, left arm and top of left chest painful, glands in left axilla swollen and tender. Positive diagnosis of anthrax confirmed. Suspected lesion was an abrasion of the finger and caused by moving the balance on the scales in weighing the hides. Recovery.

CASE 7. Edematous anthrax—fatal. A man, 52 years of age, employed in a tannery on a fleshing machine, reported to the factory physician on May 31, at 5.30 o'clock p.m., because of a suspicious pimple on the neck near the right angle of his jaw. This was not pustular, was not gelatinous, and had no eschar. The man was seen at eight o'clock a.m., June 1. Pustule was not typical, swelling had extended from right to left neck and down over right chest. At right angle of jaw two small ulcers, yellow crusted, had formed. Sent to the hospital for diagnosis. During the afternoon and evening much edema developed, and on June 2 the edema became so marked as to cause dypsnea by pressure on the trachea. At two o'clock p.m., June 2, while drinking a glass of milk, man choked and became so cyanotic that tracheotomy was performed. Man died at 3 p.m. Positive diagnosis of anthrax from smear.

CASE 8. External anthrax—indirect infection. A man, 41 years of age, employed in the tan room of a leather factory, developed symptoms of anthrax, with a lesion developing on the hand two days later. There was no previous case

of anthrax in this department. His duties consisted in handling a truck carrying hides from beam house into the room where tanning is done. These hides had been subjected to a thorough soak, had been fleshed and split, also soaked in lime before being placed upon a truck for transferring to the tanning department. The most probable source of infection in this case would seem to be from spores of anthrax on the sides of the truck, thereby infecting the man using this truck. Typical course of anthrax, positive diagnosis.

CASE 9. Malignant pustule form—fatal. Man, 64 years of age, employed as a brush-maker in sorting over quantities of horse hair and bristle recently received from China, developed on April 8 a typical anthrax pustule covering two-thirds area of lower lip and right chin. Pustule most virulent at the edge of mucous membrane. The pustule was excised on April 12, followed by much edema and enlargement of the glands, coma and death on April 14. Lesion showed anthrax bacillus.

CASE 10. Erysipelatous anthrax. Man, fifty years of age, employed in a currying shop of a tannery, consulted the shop physician on March 31 for a mild conjunctivitis of the left eye of two days' duration. There was a slight reddened area below left eye, very slight edema. On April 1 the swelling and redness had extended over the whole side of the face, closing completely the left eye. Temperature 101. Later in the day the edema extended to the neck, and there was some involvement of right eye. No typical lesion could be found. On April 2 the smear from the conjunctiva showed typical bacillus of anthrax. Recovery.

CASE 11. Wool-sorters' anthrax—fatal. Man, 52 years of age, employed as a wool-sorter, consulted the physician at his office on March 21, because of a skin eruption. Examination found swelling on the left side of neck extending towards the sternum. Temperature 102, pulse 110. Next morning swelling had increased greatly, extending to right neck. Patient complained of violent headache. Temperature 103, pulse 120. What was thought to be a pimple on the neck was burned with pure carbolic acid and corrosive poultices applied. March 24 patient was seen again. Temperature had dropped to subnormal, marked collapse, cold hands and feet. Nurse reported a large bloody stool, patient conscious and rational. Died March 25. Inoculation into animals developed typical anthrax. The particular consignment of wool worked on by this man was recently received from New Mexico, and was of an extremely dirty grade.

The State Board of Labor and Industries has prepared and distributed to the various trades and occupations in which anthrax is a possible source of infection a set of rules and regulations for the prevention of this disease.* These rules consist chiefly in preventing the carrying of hides on shoulders or against bare arms and neck, the supplying of gloves for workmen engaged in handling hides, and gauze masks for workmen employed in dusty processes of manufacture, in which infection from anthrax dust is a possibility. Separate washing and dining apartments and regulations for shop sanitation form a part of these rules. Employees and employers in the various industries named are cautioned about disregarding any cut or scratch or pimple, however insignificant or slight in appearance.

* Industrial Bulletin No. 6. Rules and Regulations Suggested for the Prevention of Anthrax. Copies furnished free on application, 7 Beacon Street, Boston.

A SERIES OF FRACTURED SKULLS FROM THE SURGICAL RECORDS OF THE BOSTON CITY HOSPITAL, 1902-1917.*

BY CARL THORBURN HARRIS, M.D., BOSTON, AND HARRY ARCHIBALD NISSEN, M.D., BOSTON.

[From the Third Surgical Service and the Fourth Medical Service of the Boston City Hospital.]

THIS is intended as a preliminary statistical study of fractured skull cases during the years 1902-1917. It is to be remembered that the clinical material of the Boston City Hospital is drawn from all parts of Boston, and that admissions include a large proportion of the police ambulance and severe industrial accident cases.

The diagnosis of fractured skull was made 540 times; in 330 cases it was definitely proved by palpation, x-ray and operation or autopsy. This preliminary paper deals only with these definitely proved cases. The records were not as complete in most cases as we should like them, so that in some records, age, sex, etc., were not noted.

The frequency of fractured skulls is tabulated in decades in the following table:

	Operated		Non-Operated	
1st decade	Relieved....	15	Relieved....	17
	Dead.....	7	Dead.....	17
2nd decade	Relieved....	8	Relieved....	9
	Dead.....	9	Dead.....	3
3rd decade	Relieved....	7	Relieved....	13
	Dead.....	5	Dead.....	8
4th decade	Relieved....	12	Relieved....	25
	Dead.....	5	Dead.....	9
5th decade	Relieved....	9	Relieved....	24
	Dead.....	11	Dead.....	14
6th decade	Relieved....	2	Relieved....	6
	Dead.....	4	Dead.....	8
7th decade	Relieved....	1	Relieved....	6
	Dead.....	3	Dead.....	1
8th decade	Relieved....	0	Relieved....	1
	Dead.....	0	Dead.....	2
9th decade	Relieved....	0	Relieved....	2
	Dead.....	1	Dead.....	1

The causes as given in the records are collected under the following heads:

Accident	271 cases
Alcohol	60 "
Suicide	8 "
Assault	15 "
Unknown	1 case

A number of cases were combinations of alcohol and accident or alcohol and assault. In such cases both causes are given under separate heads.

* Presented at the September monthly clinical meeting of the Boston City Hospital House Officers' Association.

The type of injury in the 330 cases is shown in the following table:

Simple fractures	186	cases
Compound fractures	147	"
Depressed fractures	114	"

Below are given the results of the operated and non-operated cases:

Operated cases	123	
Relieved	60	48.7%
Dead	63	
Non-operated cases	207	
Relieved	114	51.3%
Dead	93	

Below is given the time of death after operation:

	Cases
Operated and died within 3 hrs. after entrance	27
Operated and died within 24 hrs. after entrance	13
Operated and died within 3 dys. after entrance	7
Operated and died within 7 dys. after entrance	8
Operated and died several weeks after entrance	8

Cause of death in those cases which died from one to several weeks after operation was due to septic meningitis, erysipelas, pneumonia, brain abscess, or delirium tremens.

Special diagnostic work, as recorded in the past few years, is as follows: Blood-pressure findings were recorded in 39 cases. X-ray findings were recorded in 48 cases. Lumbar punctures were recorded in 11 cases. Fundi examinations were recorded in 33 cases.

It seems best to the authors to divide, in an arbitrary manner, the fractures, first as to location and second as to the two classes of simple and compound fractures. The classification as given below, of fractures of the frontal, parietal, temporal and occipital bones, does not mean that the fracture was of necessity confined to that bone alone, but that the larger part of the fracture was in that region.

I. FRACTURES OF FRONTAL BONE.

Simple	13	Operated	6	Relieved 6, Dead 0
		Not operated	7	Relieved 4, Dead 3
Compound	49	Operated	17	Relieved 12, Dead 5
		Not operated	32	Relieved 24, Dead 8

Total ..... 62, or 18.8%.

Many of the fractures of the frontal bone are found to be only of the outer table, breaking through into the frontal sinus. A large proportion of the compound fractures is of this type. Operation as given means a decompression, and not the simple cleansing and suturing of a scalp wound, although such a wound may extend to the line of fracture. The cases of a simple fracture of the frontal bone requiring operation were all those in which a definite depression was felt or shown by radiograph.

II. FRACTURES OF PARIETAL BONES.

Simple	60	Operated	24	Relieved 11, Dead 13
		Not operated	36	Relieved 20, Dead 16
Compound	59	Operated	32	Relieved 15, Dead 17
		Not operated	27	Relieved 15, Dead 12

Total ..... 119, or 36.0%.

These fractures might be classified as fractures of the vault. As a rule, the compound fractures were those which required immediate operation or at least within 24 to 36 hours after time of injury. The simple fractures, for the most part, unless a definite depression was made out, were operated upon at a time varying from 36 hours to 10 days. This was done only for definite signs of increasing intracranial pressure, *i.e.*, increasing blood pressure, nausea, vomiting or choked disc, or for focal signs due to pressure over a motor area. Among the children many of the fractures of the vault were of the "cracked egg-shell" type. These latter are included under the head "not operated," "dead."

III. FRACTURES OF TEMPORAL BONES.

Simple	32	Operated	14	Relieved 7, Dead 7
		Not operated	18	Relieved 10, Dead 8
Compound	18	Operated	9	Relieved 5, Dead 4
		Not operated	9	Relieved 3, Dead 6

Total ..... 50, or 15.1%.

Bleeding from one or both ears is not considered as diagnostic of fractured skull in this group, or in fracture of the base. Many of these diagnoses were made by aural men who found definite fracture through the bony wall of the auditory canal.

IV. FRACTURES OF OCCIPITAL BONE.

Simple	22	Operated	6	Relieved 0, Dead 6
		Not operated	16	Relieved 9, Dead 7
Compound	13	Operated	7	Relieved 3, Dead 4
		Not operated	6	Relieved 6, Dead 0

Total ..... 35, or 10.7%.

Fractures in the above list are those of the upper portion of the occipital bone, due for the main part to a crushing injury over a small area of the bone. The operative results are interesting in that but three out of thirteen cases recovered.

V. FRACTURES OF BASE OF SKULL.

Simple 55	Operated 7	Relieved.. 1	
		Dead..... 6	
	Not operated.. 48	Relieved.. 20	
		Dead..... 28	
Compound.. 9	Operated 1	Relieved.. —	
		Dead..... 1	
	Not operated.. 8	Relieved.. 3	
		Dead..... 5	
Total ..... 64, or 19.4%.			

This gives, out of 330 cases, a total of 123 operated cases, of which 48.7% were *relieved.*

The decompressions have been divided into three definite groups:

a. Immediate at site of fracture, of which there were 78 cases. Thirty-six of these recovered and 42 died. A large number of these were operated for a compound fracture, either comminuted, depressed, or with extensive laceration of dura and brain.

b. Right subtemporal, until recently the operation of election for the relief of intracranial pressure in cases showing no localizing signs. Nineteen cases of this kind are recorded, 14 of which died and 5 recovered. One instance is recorded of a case discharged with a definite paralysis of the left arm following operation.

c. For localizing signs or symptoms, 13 cases, of which 4 died and 9 recovered. These for the most part were due to late development of signs from blood clot, lacerated brain or foreign body.

d. Occipital, 13 cases, 10 of which died and 3 recovered. All but one of these might be classified under immediate, but have been given a separate place due to the recent interest in the question of occipital decompression for fractures of the base, with increased pressure under the tentorium. One case was operated for definite localizing signs appearing three days after operation.

It seems of interest to note, in relation to prognosis, the mortality, considering the mental condition of the patient at entrance.

This table includes all cases in which the records state the mental condition of patient at time of entrance. The percentage of cases relieved is seen to be in inverse proportion to the change from normal mental condition of the patient.

Unconscious 112	Operated ... 52	Relieved 7	13.2%
		Dead... 45	
	Not Operated 60	Relieved 14	23.3%
		Dead... 46	
Conscious and irrational.. 50	Operated ... 21	Relieved 13	61.9%
		Dead... 8	
	Not Operated 29	Relieved 21	72.9%
		Dead... 8	
Conscious and rational.... 82	Operated ... 29	Relieved 24	82.7%
		Dead... 5	
	Not Operated 53	Relieved 45	84.9%
		Dead... 8	
Extreme shock..... 17	Operated ... 1	Dead... 1	
	Not Operated 16	Relieved 4	20.0%
		Dead... 12	

The original tabulation of cases and their findings offer facts which we have not discussed in detail, but wish to mention briefly.

The large proportion of the cases in which the pupils were dilated and fixed died, thus giving that one physical finding a fair guide to an unfavorable prognosis.

Some of the cases which were operated with the idea of a decompression had a small area of bone removed, usually subtemporal, and then the dura was left intact. These cases, as a whole, did badly, *i.e.,* pressure symptoms did not clear up rapidly if at all. The brain in one instance was found not pulsating, but the dura was not opened. In other cases pulsation of the brain began shortly after the dura was opened and the pressure relieved. Thus it seems necessary, for a complete decompression, to open not only the bone, but the dura as well.

Suture of the lacerated or incised dura was performed in several cases. The result was not satisfactory. Usually the dura could not be approximated. In one case a subdural abscess developed at this point, requiring subsequent operation. Later came a definite brain abscess, ending in meningitis and death.

A rubber tissue drain was inserted to the dura in several cases of clean decompression, *i.e.,* not for or following a compound fracture. There is no evidence that shows the relief of symptoms to be more rapid or complete following such treatment than in the cases closed up tightly after removal of a large bone flap with opening of the dura. The cases apparently indicating drainage due to bleeding not ceasing with relief of intracranial pressure were few in number. Infection followed with fatal results in several of these cases.

Our study of the above cases would seem to indicate: routine two-hour blood-pressure readings for the first 24 to 48 hours; lumbar puncture in all cases; fundus examination at time of entrance and at intervals indicated by the general condition; x-ray examination of all head injuries; withholding morphia until a definite diagnosis is made, and controlling of restlessness with bromides if possible; thorough neurological examination backed up and checked by consultation with neurological service.

There is a possibility of better operative results in fractures of the base by early recognition and relief of symptoms by extensive decompression, either tempo-parietal bone flap or occipital trephine.

The above series would indicate that operative results in view of prognosis are better in the first and fourth decades than at any other age.

REPORT ON THE TREATMENT OF MYELOGENOUS LEUKEMIA WITH RADIUM.

By Francis W. Peabody, M.D., Boston.

[From the Cancer Commission of Harvard University.]

Since the opening of the Huntington Hospital five years ago, 36 cases of chronic myelogenous leukemia have come under observation. Nineteen of these have died, and at the present time 17 cases are being more or less actively followed. The physician in charge of the group of patients with leukemia meets them on one afternoon a week at the Hospital. Patients are supposed to report weekly for general examination and blood examination, but those whose condition is satisfactory or who live at a distance may be excused from attendance at the clinic for two or three weeks at a time. Constant supervision is an important factor in the care of these patients, for it makes possible the institution of radium therapy when the earliest signs that it is indicated appear. Occasionally patients disappear for long periods, to return only when severe exacerbations of the disease have appeared. It is, of course, impossible to control all patients as carefully as would be desirable, but over half of the present group report with considerable regularity.

RESULTS OF RADIUM TREATMENT.

The results from the use of radium may be discussed from the point of view of its effect on the general symptomatic condition of the patient, on the splenic tumor, and on the blood picture.

Symptomatic Condition. One of the most striking results of radium therapy in this series of patients with leukemia has been the general clinical improvement. Without exception the cases treated during the last eighteen months (the duration of personal observation by the writer) have shown symptomatic improvement, and in some instances (15,274; 15,322; 16,161; 14,140) the change has been little short of remarkable. Patients who were at one time bedridden, extremely weak, pale, dyspneic, and apparently in a very serious condition, have regained their strength and have subsequently returned to leading a comparatively normal life. Almost all of the patients who have been closely followed during the past year and a half are at work or performing their usual household duties. The appetite improves, the digestive disturbances gradually become less, and weight is usually gained. Headache is often relieved, and buzzing, roaring or "beating" in the ears, a common and disagreeable symptom, frequently diminish, and are sometimes completely cured. In one instance with complete deafness (16,406), the hearing was not improved even after many treatments with radium.

The Spleen. When first seen the patients have a large, often an enormous spleen, but under the influence of radium a rapid decrease in size takes place. In many cases the spleen diminishes so that its lower pole is above the costal margin, and in some instances it has become so small as not to be palpable. Occasionally it may be impossible to reduce the size of the spleen so satisfactorily and it remains enlarged so that the lower edge is well below the ribs. In one case, (16,125) the spleen became greatly enlarged during a terminal exacerbation of the disease and continued so in spite of vigorous treatment until the patient's death. In general, the patients in whom radium therapy produces a decrease in the size of the spleen seem to be the most favorable cases for treatment. The shrinking of the spleen may be a rapid process and an organ which has filled nearly one-half of the abdominal cavity may disappear behind the ribs in the course of 8½ weeks and after 13 treatments (16,346).

The Blood. The most definite effect of the application of radium in myelogenous leukemia is on the blood picture. In cases which have received no previous similar treatment and which have a high leucocytosis, the number of white cells usually begins to fall in from 24 to 72 hours after the radium is applied. The decrease in the leucocytosis is often rapid and continues for days and even several weeks after the radium was administered. In one patient the white count dropped from approximately 100,000 to 6100 in 25 days, radium having been given on the first and thirteenth days only. Even more striking results have been observed in other instances. Associated with the decrease in the total leucocyte count there is a change in differential count. Myelocytes and immature forms of polymorphonuclear leucocytes become less prominent and a larger proportion of adult polymorphonuclear cells is found. Usually, however, careful searching will always reveal the presence of a limited number of typical myelocytes. Patients with an anemia, who respond well to treatment, show a rise in hemoglobin and in the red cell count associated with their improvement. On the other hand, the development of an anemia in a case under observation is to be regarded as a serious sign. A fall in hemoglobin and the occurrence of many nucleated red cells is of serious prognostic significance, but the picture may improve in response to radiation. An important point to bear in mind is that the development of anemia may be the result of too much radiation. It is almost certain that this took place in one patient (16,406) who died with a low white count (2000), and a hemoglobin of 10%. This case, which presented remarkable pathological lesions, will be reported in detail by Dr. Goodpasture.

While it is comparatively easy in most cases to bring the leucocyte count down to normal, it is much more difficult to keep it there. A remission usually takes place after a few weeks, and more radium must be applied. The attempt has been made to treat patients soon after

the white count began to rise, and by prompt application of radium it is possible to keep the count at from 5000 to 40,000 or 50,000. Often the leucocyte count will remain within normal limits for weeks without any treatment. One patient (15,274) came into the hospital in January, 1916, with a bad clinical relapse and a white count of 248,000. His leucocytes were reduced to 6000 on February 29, 1916, and remained below 17,400 without any treatment until Nov. 23, 1916. In general there seems to be a close parallelism between leucocyte count and clinical condition. When patients report that they are feeling poorly the white count is frequently found to be high. This is not always true, however, and patients seem to do well clinically if their leucocyte count is not over 50,000. The white count, however, is the best routine guide to treatment, and the attempt is always made to keep it within normal limits. The intervals at which it has been necessary to administer radium have varied greatly from case to case in any given individual, but they have perhaps averaged one to three months.

In one of our cases a few applications of radium were made over the long bones, but in all other instances treatment has been applied over the spleen in the French manner used in this Hospital and recently described by Ordway in detail.[1] Our experience does not as yet enable us to state definitely as to the best dosage, but recent results have seemed to indicate that the administration of one or several large treatments, followed by an intermission of at least several weeks, until all evidence of radium action has ceased, is more satisfactory than the use of smaller doses at more frequent intervals. This, however, is a point which requires further study. Extensive radiation over the spleen often produces nausea which persists for one to four or five days, and in some instances vomiting occurs. The danger of excessive radiation has already been referred to. This is best avoided by not instituting new treatment until the effects of the last treatment have completely subsided, and by watching carefully the hemoglobin and red count as well as the leucocyte count.

When, under the influence of radiation, a large splenic tumor decreases in size rapidly it is to be expected that profound changes in the metabolism and in the excretion of waste substances in the urine will take place. The opportunity was therefore taken to study as thoroughly as possible the metabolism in one of our cases. The patient was in the wards of the Peter Bent Brigham Hospital and was kept on a carefully calculated constant diet for a period of nearly forty days. Frequent observations were made on the gaseous exchange, and on the various constituents of the blood, and daily analyses of the urine were carried out. The results of this study will form the basis of a separate communication.

It is too soon for us to make any final statement as to the effect of radium therapy on myelogenous leukemia. In spite of the comparatively large number of cases which have attended the clinic, only a few can be regarded as having been thoroughly or satisfactorily treated, and the natural duration of the disease is so variable that it is quite impossible for one to know whether or not the length of life has been influenced. It is, on the other hand, quite certain that temporary remissions of the disease have been brought about, and that patients who were in a most distressing and apparently serious condition have been restored to a useful and functionally efficient existence.

REFERENCE

[1] Ordway: BOSTON MED. AND SURG. JOUR., Vol. clxxvi, No. 14, April 5, 1917, p. 490.

OBSERVATIONS AT THE PETER BENT BRIGHAM HOSPITAL ON CASES OF PNEUMONIA IN RELATION TO TYPES OF PNEUMOCOCCI AND THE SERUM TREATMENT OF TYPE 1 CASES.*

BY H. L. ALEXANDER, M.D., BOSTON.

[From the Medical Service of the Peter Bent Brigham Hospital.]

FROM July 1, 1913, when the medical wards of the Peter Bent Brigham Hospital were opened, until April 15, 1917, 210 patients were recorded with the diagnosis of lobar pneumonia. The individuals thus represented were characteristic of those in the average general hospital, in which no particular type of individual dominates, although but few children were admitted. Excluding terminal pneumonias, questionable cases and pneumonias of infants and young children, 23 in all, many of the cases were grouped according to the classification worked out at the Rockefeller Hospital,[1] and we are indebted to that institution for our immune serum. Of the 187 cases considered, 104 were grouped. Such work was done periodically when available men could devote time to it, and some selection of cases was made, in that very mild cases, those having crises on admission and cases in children were frequently neglected, as is manifested below by the mortality statistics of grouped and ungrouped cases. During the past winter all but two cases were classified according to their serum reactions. The following statistics were obtained:

	No. of Cases	Per cent.	Survived	Died	Mortality
Group 1†	25	24.0	17	8	32.0%
Group 2	22	21.2	13	9	40.9%
Group 3	12	11.6	6	6	50.0%
Group 4	45	43.2	34	11	24.4%

* Read at the meeting of the Association of American Physicians, Atlantic City, May, 1917.

† Group 1 cases not treated with serum—14 cases, with 42.8% of mortality. Group 1 cases treated with serum—11 cases, with 18.2% mortality.

The total mortality of the 104 grouped cases was 32.7%, whereas in 83 ungrouped cases this was 16.8%,—a combined mortality of 25.7%.

The incidence of cases in the several groups varied moderately from year to year. The notable exceptions were that Group 4 included 61.4% of the cases in 1914, and that during the past winter 9 Type 3 cases were encountered, several of which ran unusually mild courses. It has been suggested that sputa obtained in some of the latter instances may have been mouth specimens in which the occurrence of Type 3 organism is considerable,[2] but only one case is subject to such suspicion. Also it is possible that serum now employed in the determination of this group, which was not available in previous years, may detect these cases with greater accuracy.

	Group 1	Group 2	Group 3	Group 4	Total
1914	3	3	1	11	18
1915	6	8	0	16	29
1916	7	7	4	10	28
1917 (to Apr. 15)	8	4	7	8	27

Twenty-one positive blood cultures (22.6%) were obtained from 93 of the grouped cases, of which 15 (71%) occurred in fatal cases, whereas of the 72 patients with negative cultures, but 14 (18.9%) died. In 49 unclassified cases, 8 positive blood cultures (16%) were observed. Two of the patients yielded the bacillus mucosus capsulatus at autopsy.

No systematic effort was made to employ serum treatment until this past winter, when it was administered to all cases with Type 1 infection. These were treated as soon as the diagnosis was established, and large doses were given intravenously—at frequent intervals when necessary. The 11 patients so treated represented both mild and severe infections.

As a rule, a critical fall in temperature occurred within a few hours after serum infusion, followed usually by a slight rise, which could be controlled by serum. Frequently more than one treatment was necessary to reduce the temperature below 100.° Some cases, usually the more severe ones, showed a precritical rise of 2° or 3°, accompanied by a chill. In these instances, however, the subsequent fall was proportionately greater, in one instance 8°. Cases in which the disease was of short duration usually required but one treatment.

A cutaneous test, similar to the von Pirquet test, with horse serum protein, was done routinely before treatment, and in one instance this was positive, the patient reacting likewise to horsehair protein. Although ¼ cc. of serum, which was then given subcutaneously, induced a violent asthmatic attack, by the use of very small desensitizing doses (1/40 cc.), which were gradually increased until intravenous injections could be tolerated, he was eventually made to withstand 70 cc. of serum introduced intravenously and following serum treatment, recovered from his pneumonia. A second patient, with a history of asthmatic attacks, gave a negative skin reaction to serum protein, but had asthma immediately after treatment. He was subsequently found to be sensitive to horsehair protein. A more detailed discussion of these two cases will be found under the title "Asthma Complicating the Serum Treatment of Pneumonia," in the *Archives of Internal Medicine* of October, 1917.[3]

Serum sickness occurred in most cases about a week after treatment, although it was absent in the two asthmatics. This serum sickness was never very severe, no joint manifestations or prolonged course having occurred.

There was but one instance in which serum seemed to have no beneficial effect. This was in the case of a man of 54 years with a pneumonia of many days' duration, in delirium tremens, having intense bacteriemia and a white blood cell count of 4200. He was treated intensively with serum, but failed to rally. Another fatal case was that of a woman who responded to serum treatment, but during her apparent convalescence, after the temperature had been approximately normal for 6 days, died suddenly. Autopsy revealed a large thrombus in the right internal iliac vein, with an embolus lodged at the bifurcation of the pulmonary artery. She had manifested no signs whatever of phlebitis. A patient with a Type 4 infection showed evidences of thrombosis of the right subclavian vein; these being the only examples of this complication in the entire series of pneumonia patients. Two cases treated with serum No. 1 developed empyema.

The mortality of this treated series was 18.2% if the case dying of pulmonary embolism during convalescence is included. If this patient is not included as not having died as the direct result of the pneumonia, the mortality was 9.1%. This, when contrasted to the 42.8% death rate of Type 1 cases not receiving serum treatment, indicates the therapeutic value of antipneumococcus serum.

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Medical Progress.

RECENT PROGRESS IN PHYSIOLOGY.

II.

BY P. G. STILES, PH.D., BOSTON,
Assistant Professor of Physiology, Harvard University.

A New Instance of Biological Adaptation during Excitement.—Two years ago Cannon summed up in a most interesting book[1] a number of physical changes which accompany emotional disturbances in men and animals. He was able to show in an impressive way that

these changes are, on the whole, such as promote the welfare of the individuals which exhibit them. It was pointed out, first of all, that the normal occasion of excitement is an emergency calling for strenuous action. It was then made evident that the bodily changes in emotional crises confer on the subject the fullest command of its resources. The best possible preparation for either conflict or flight is promptly effected.

We may briefly recall some of the reactions thus shown to make for self-preservation. They include the following: stimulation of the heart, diversion of blood from the viscera to the muscles, increase of sugar in the circulation. These three clearly help to sustain muscular activity. In addition, there is an augmented production of adrenin, and proof has been furnished that this internal secretion postpones fatigue. The composition of the blood is so modified that its coagulation-time is shortened; this may be regarded as a defensive change. There is an involvement of the thyroid in the emotional syndrome also.

Now we can add to this list of adaptive changes another which seems equally advantageous. The observations are reported by W. E. and E. L. Burge.[2] These investigators have determined the catalase content of the liver in cats subjected to excitement and in control animals. Catalase is an enzyme which accelerates the liberation of oxygen from hydrogen peroxide. Its presence in most tissues is demonstrable, and it is natural to suppose that there is some correspondence between its abundance and the local capacity for oxidation. The experimenters thought that an increase of the liver catalase in consequence of excitement might be looked for. Their expectation proved to be well founded.

The young cats chosen for the trial were confined in cages and frightened or enraged by a noisy dog. The method is not new; there is no doubt that it is effective. It was employed on two successive days, then the cats, five in number, were killed with ether. The liver of each animal was ground up and the catalase determination made with one gram of the finely divided material. Results are stated in terms of the number of c.cm. of oxygen gas set free from 700 c.cm. of H_2O_2 solution in 10 minutes at 22°. The average quantity is given as 3036 c.cm.

Five control samples of liver substance were prepared from cats which had not been recently frightened or angered. The average volume of oxygen liberated under the influence of these samples is recorded as 1588 c.cm. The individual figures did not show a very wide variation—1400 to 1875. There can be no doubt that the emotional disturbance was attended by an increase of catalase in the liver, amounting apparently to 90%. Further evidence is furnished to show that this catalase enters the blood where it can be distinguished from that ordinarily present by certain specific properties. The natural inference is that at the same time when the liver glycogen is being resolved to furnish sugar for the muscles, an agent to promote oxidation of sugar is mobilized by the hepatic cells.

Experimental Findings and Pellagra.—In the course of the last few years there has been much discussion concerning the nature of pellagra. The claim that it is a "deficiency disease," having affinities with scurvy and beriberi has been constantly urged. On the other hand, the theory that pellagra is infectious has continued to have proponents. When a number of people who are closely associated suffer from a malady, careful observation may be required to determine whether it has been communicated from one to another or whether it has resulted from similar living conditions obtaining for all the victims. Beriberi has come to be referred confidently to the diet; a decision in case of pellagra has seemed more difficult.

Chittenden and Underhill[3] have recently presented a body of evidence favorable to the view that pellagra is a deficiency disease. They have produced in dogs a pathological state closely resembling it, and the controlling factor has been the food. The writers have been engaged for a long period in studies of nutrition. The records of their laboratory (in the Sheffield Scientific School) include detailed histories of hundreds of animals. The data for the present report are drawn in part from notes made ten or twelve years ago. New trials have been made to check the old.

The recognition of pellagra is not always easy. Its variations have been described as "protean." When the disease runs a typical course we have the alliterative catch-words, "diarrhea, dermatitis, delirium, death." Where there are a number of undoubted cases, dubious ones will also be found. The disorders exhibited by the dogs presented a very clear clinical picture with few individual variations. The diets tending to induce the disease were distinguished by the fact that boiled peas constituted the chief source of nitrogen. The symptoms were established sooner if no other proteins were supplied, could be deferred by including a small amount of meat, and quite prevented by more liberal supplies of animal food.

The disturbances were chiefly of the alimentary tract. After a time food was refused, apparently because of sore mouth. At the same period, or soon after, bloody diarrhea set in. The discharges were excessively foul; the same odor was on the breath. The mucous membrane of the mouth underwent free desquamation. After death, which soon supervened the buccal lining was beset with pustules, and there was a general congestion of the intestinal wall. In a few cases, which had been marked by convulsions toward the end, there was definite ulceration of the duodenum.

The paper of Chittenden and Underhill is of particular interest because it shows so clearly

that the disease produced was due to the lack of something and not to positive poisoning. If the boiled peas were harmful, the symptoms would have been aggravated by increasing the ration. But the fact was that more liberal supplies of the food postponed the ill effects. It is natural to conclude that, whatever the nature of the valuable substance, it is present in the peas but too scantily to meet the requirement.

"Are Schoolrooms Drier than Deserts?"—This is the title of a paper by Palmer,[4] the chief of the Investigating Staff of the New York State Commission on Ventilation, a board that has published much of interest. Students of hygiene have emphasized very strongly in recent years the possible ill effects of excessively dry air. Rooms which are artificially heated are often extremely dry. The relative humidity or percentage of saturation in such places may be represented by figures as low as 30 or even 25. It has been claimed that such atmospheres damage the linings of the nose and throat, partly because of the rapid abstraction of moisture from the membranes and partly, perhaps, because dust is easily raised and kept floating when such conditions prevail.

Desert humidities have been reported all the way from 19 to 46%. If these numerical values are final criteria, we must conclude that schoolrooms are indeed as arid as deserts. Palmer proceeds to point out that we cannot fairly use this single standard as a measure of dryness. When we say that a room is dry we mean that it is a place where rapid evaporation occurs. We base our judgment, very likely, on the feelings associated with hands, lips, eyes, and nostrils. Now evaporation from these moist surfaces does not depend solely on the relative humidity of the atmosphere. It depends on temperature and on air currents as well.

There is seen to be an important difference between dryness of air, in the literal sense of limited moisture content, and the *drying power* of air exerted upon wet bodies. To measure the latter we may have recourse to the katathermometer of Leonard Hill. Or we may use the instrument described by Palmer under the name of the atmometer. The principle involved is the determination of the amount of water evaporated in a unit of time from a unit area of a porous, saturated surface. The quantity will be duly influenced by temperature, humidity, and movement of the air. It is well stated that the human body differs from artificial instruments for measuring evaporation because it does not maintain a saturated surface. Dryness of the skin may be due to restricted secretion, as well as to excessive vaporization. The former is felt in cold, the latter in hot, breezy weather with low humidity.

When desert and schoolroom conditions are compared, the desert is found to have the greater dehydrating effect, in spite of similar relative humidity. The higher temperature is, of course, a factor. When the movement of the air is estimated, a great contrast is apparent. The average current indoors is only 25 feet per minute, against 500 feet per minute in the open. With great insight, Palmer suggests that while the desert air is undoubtedly more drying to the skin, it is quite possible that the schoolroom air is more drying to the nasal passages. This is because the temperature within the nose is nearly constant and the air-currents are those of the breathing, and independent of the environment. Relative humidity should thus be the only differential.

The Cerebrospinal Fluid.—The amount of recent literature upon this subject is strikingly large. An interesting summary is afforded in an address by Halliburton[5] before the Section of Neurology, Royal Society of Medicine. The fluid in question is now held to be a true secretion elaborated by the epithelial cells of the choroid plexus within the cerebral ventricles. That it has this rank is shown by its composition, which is markedly unlike that of ordinary lymph, and by the fact that its pressure does not vary directly with that of the blood. The fluid occupies but a small space, yet all the evidence tends to show that its formation proceeds steadily; of course there must be a corresponding withdrawal from the narrow confines of the meninges. The depletion appears to take place into the venous sinuses by way of the arachnoid villi.

The barriers between the cerebrospinal fluid and the blood exhibit in a high degree the property of irreciprocal permeability. That is to say, transfers of many dissolved substances from the cerebrospinal fluid to the blood take place with great freedom, while the opposite movement, from blood to cerebrospinal fluid, is nearly an impossibility. Such a drug as adrenalin introduced into the sub-arachnoid space exerts its full effect almost as promptly and clearly as though the injection had been intravenous. Less diffusible compounds do not find their way to the circulation so readily, a fact which is held to prove that there are no actual openings into the cranial sinuses from the meningeal spaces, as was once believed.

The cerebrospinal fluid has often been described as the lymph of the brain. When it is compared with lymph as found elsewhere, we are impressed with its poverty in proteins and in formed elements. The obvious suggestion is that what we call the secretory property of the cells in the choroid plexus is not so much the capacity to add new compounds as to keep back the abounding proteins of the blood. The secreting cells of the sweat-glands have a somewhat similar action.

The speculative part of Halliburton's paper has to do with the question why proteins should be excluded from the cerebrospinal fluid. The writer reminds us of the use of Ringer's and Locke's mixtures in our laboratories. These are

substitutes for lymph or blood-plasma, the first inorganic, the second containing a small percentage of dextrose. We have not found it at all advantageous to add proteins to such mixtures. Halliburton conceives the cerebrospinal fluid to be a Locke's solution of exquisitely balanced constitution. It is the medium best suited to the maintenance of the nerve-cells and the support of their activities. Provision is made for its rapid renewal, so that fresh portions are continually brought to bear upon the elements of the cortex.

Finally, it is suggested that the brain-cells need to be shielded from proteins because toxins belong to this class of compounds. When bacterial poisons are abroad in the circulation, and the organism is contending against them, it must be a great advantage to have the environment of the central neurons protected from their approach. We may suppose that this protection is secured, in a measure, by having the cells of the choroid plexus impervious to proteins. Being so constituted as to hold back the colloids of normal blood, they are also proof against the passage of toxins. It is pointed out that this impermeability of the choroid plexus must be reckoned with in choosing therapeutic agents designed to operate in the brain, particularly in treating syphilis.

One-sided Permeability.—It will be well to follow the foregoing review with a reference to an article by Robertson.[6] The so-called selective power of cells by virtue of which they receive certain dissolved substances and reject others is of the greatest interest. It is related equally to problems of secretion and absorption. A question which immediately arises is whether living cells showing such a power apply metabolic energy of their own to the transfer of molecules. This has generally been held to be the case with the kidney. How far can selective behavior be maintained on a structural basis alone? The studies of Clowes, Osterhaut, and others are throwing much light on this matter.

Before we can hope to understand the complex subject of selective absorption, we must master the more elementary facts of one-sided permeability. It is known that many membranes composed of living cells act in totally different ways upon fluids brought in contact with one or the other of their surfaces. Thus the intestine absorbs a solution of dextrose from its lumen without returning to the same cavity more than a trace of the sodium chloride of the blood. The external surface of the intestine cannot absorb dextrose from the peritoneal cavity without returning salt. We are wont to pass over such facts with the simple statement that the mucous membrane is specialized for absorption, while the serous surface is not. This is not an explanation.

Robertson shows that the structural peculiarities of protoplasm which determine its permeability must be of a submicroscopic order. It is natural to assume that a leading feature must be the relation of the lipoids to the water-soluble constituents. We know that the state of the fatty components may change quickly. At one time they may be in globules demonstrable with the microscope, at another they may be quite invisible and yet undiminished in amount, as analysis will show. Permeability is almost certain to change with such alterations in the character of the protoplasm.

If, for example, the lipoids should form a continuous film at the surface of a cell, complete impermeability to substances dissolved in water might result. If the fats should separate in relatively large globules the interstices might offer free passage to all kinds of water-soluble compounds. If the lipoids should form an aggregate composed of ultra-microscopic globules, the layer might be a literal molecule sieve. The pores between the fatty particles might be of an order of magnitude to permit the ingress of certain molecules, while keeping others back. A selective absorption could thus be manifested, and its characteristics would be changed by any circumstance affecting the state of lipoid aggregation.

Robertson passes from these considerations to the more difficult subject of one-sided permeability. He suggests that we consider the following hypothetical type of organization. The fatty material near the absorbing surface of the cell is so arranged as to enclose conical portions of the water phase, the bases of these minute cones being outward. The apices of the cones, pointing inward, are not mathematical points, but are like the stems of funnels leading into the interior of the cell. These stems are of such diameter as to transmit certain molecules in preference to others. The expanded bases of the cones will absorb dissolved substances freely and the apices will discharge the absorbed molecules into the deeper regions.

Such a mechanism will not operate in the reverse fashion. Diffusing molecules will fail to enter the "stems of the funnels" in appreciable numbers. The following crude comparison may help one to visualize the principle. Imagine 100 flower-pots standing upright and, nearby, an equal number inverted. If a shower beats upon the pots it is easy to appreciate how much more water will be collected by the upright group than by their neighbors which present only small openings to the pelting drops. The second set are relatively "impermeable" as they stand, but are capable of becoming so if turned over. Technically speaking, all flower-pots have one-sided permeability.

These conceptions of a structural basis, correlated with peculiarities of secretion and absorption, are in the highest degree clarifying. But it would be hasty to conclude that all the problems in this field can be readily solved by such devices. Sieves with conical orifices may account for some instances of selective action and cellular polarity. Many other factors must be

invoked to explain other cases. We must not forget that the cells of the intestinal wall receive sugar freely from the lumen but refuse to absorb highly diffusible compounds, like magnesium salts. It will be difficult to picture a sieve which will effect this result. Still, it is sound practice to make the most we can of mechanistic ideas, and Robertson's contribution is a welcome one.

The Light of the Firefly.—The preceding abstracts have presented subjects of more or less direct interest to the physician. It may be permissible to report some observations which are not so closely related to his primary concerns, but which illustrate the breadth of the field in which physiologists are at work. One of the most curious manifestations of metabolic energy is the light production exhibited by the firefly and other organisms. Scientists have been stimulated and baffled by it. They have thus far failed to discover the means of producing light without heat, an achievement very nearly compassed by the luminous insect. Yet much has been learned about the conditions of such light production, and attention may be called to a recent paper on the subject by Harvey of Princeton.[7]

It has been possible to prepare from the luminous parts of several species two chemical compounds which are individually non-luminous but which emit light when mixed in solution. The presence of oxygen is necessary for the reaction. Of these two compounds, one is indiffusible and readily destroyed by heat; Harvey calls it *photogenin.* The second is capable of dialysis and thermo-stable; it is termed *photophelein.* The investigator set himself to find out which of these two bodies should be regarded as the fuel evolving the light. A satisfactory solution of this question proved possible.

There are two common species of firefly; one of these produces an orange, the other a greenish light. Harvey prepared separately the *photogenin* and the *photophelein* of the two. He then found that when he mingled the unstable, colloid substance of one species with the stable, diffusible product of the other the resulting light had the color proper to the species furnishing the first-named material (*photogenin*). The colloid, accordingly appeared to be the fuel and to be appropriately named. Why is energy released when these two compounds are brought together? It might be thought that the *photophelein* should be regarded as an oxidizing enzyme, but Harvey inclines to a different conception.

He shows that a number of other reagents besides the natural one, *photophelein*, will cause a solution of *photogenin* to emit light. These artificial substitutes have one common character: they are cytolytic agents. This, then, may be the essential property of *photophelein.* The solution in which it does its work does not, indeed, contain cells nor protoplasmic fragments of any appreciable size. But it does contain colloid aggregates which can be disintegrated by a process akin to cytolysis. Such disintegration means mutiplication of surface and the development of conditions favoring the reaction with oxygen.

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Clinical Department.

UNUSUALLY LARGE HYDROSALPINX: REPORT OF A CASE.

BY L. E. PHANEUF, M.D., BOSTON.

THIS case proved interesting, not on account of its rarity, but from the standpoint of diagnosis.

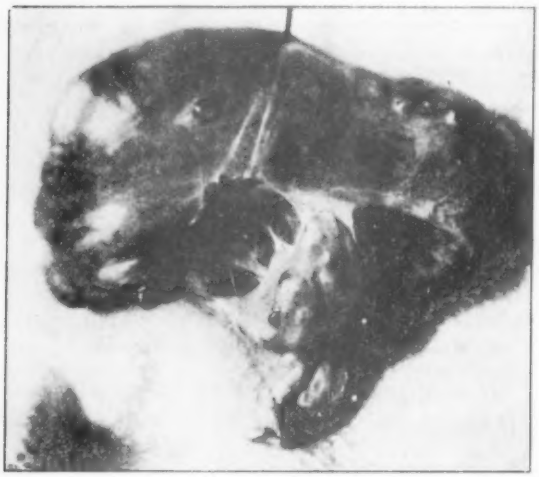
Miss M. S., 26 years old, machine operator. Born in Russia. Admitted to the Carney Hospital, Gynecological Service, April 19, 1916. *Complaint*—Pain in the right lower abdominal quadrant, sharp and severe in character. *Family History*—Negative. *Previous History*—Negative. *Menstrual History*—Onset at 13 years of age, regular, every four weeks, flow profuse, very painful, duration three to four days. Last period two weeks ago. Previous period six weeks ago.

Left ovary and left tube. Weight, 3 lbs.

Present Illness—Previously well, until nine months ago, when she was taken with a severe, and sharp pain, in the right lower quadrant of the abdomen. During this time, the patient was employed at one of the local hospitals, where she was examined, and told she had appendicitis. The pain lasted two days, and disappeared; she had no nausea or vomiting at that time. She was free from pain until four days ago, when she had another attack, practically the same as the first; this time, how-

ever, the pain has persisted, and is more severe. No vomiting with the present attack; urination negative; appetite good; bowels very constipated; leucorrhea, slight; headaches, none.

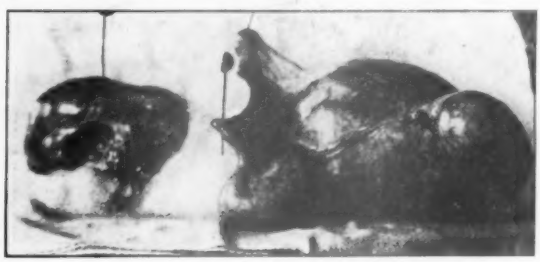
Abdominal Examination—A large, oblong, cystic mass, free in the abdominal cavity, signs of fluid on percussion. This mass fills the right lower abdominal quadrant and extends above the umbilicus; it can be moved from right to left, feels symmetrical, and is resilient. Examination otherwise negative.



Right tube and ovary. Weight, 10½ oz.

Vaginal Examination—Outlet slightly relaxed, no sign of infection of urethra or vulvo-vaginal glands; cervix nulliparous, in good position. Uterus normal in size, in position, freely movable. There is a small mass the size of an orange in the right pelvis, none in the left. The large mass is out of the pelvis, and may be moved from side to side, and upwards and downwards. No marked tenderness on examination.

Pre-operative Diagnosis—Ovarian cyst with twisted pedicle.



Right tube and ovary. Left tube and ovary. Combined weight, 3 lbs. 10½ oz.

Operation—Double salpingo-oophorectomy, appendectomy, resection of omentum, fixation of the uterus; gas-ether anesthesia, April 19, 1916. Median abdominal incision from symphysis to umbilicus. On opening the peritoneum a large mass was found free in the abdominal cavity. This was attached to the left broad ligament by a long twisted pedicle. The mass was the size and shape of an ordinary squash. The pedicle was unwound, clamped and resected. The mass was entirely tubal. The ovary was small and cystic, and was removed with the tube. On the right the tube was also enlarged, cystic and elongated. It was removed, togethter with a small cystic ovary. The large tube in making its way out of the pelvic cavity had perforated the omentum, and this tore easily in separating it from the tube. The torn portion of the omentum was resected. The appendix was not primarily involved. There were, however, two firm bands of adhesions to the right infundibulo-pelvic ligament. These bands were cut and the appendix was removed in the usual way. The uterus was normal. It was fixed to the abdominal wall by the Olshausen method, using silk sutures. Closure in layers. The large tube and ovary weighed 3 lbs. The small tube and ovary weighed 10½ ozs. Combined weight, 3 pounds 10½ ozs.

Pathological Diagnosis by Dr. Timothy Leary, *tubercular salpingitis.* The lining mucosa of both tubes was studded with miliary tubercles. NOTE.—No tubercles were found on the peritoneum, or intestines, at the time of operation. There was no free fluid in the peritoneal cavity.

Convalescence uneventful. Out of bed on the 12th day, May 4, 1916. Discharge Note—Abdominal incision well healed throughout, no tenderness, slight induration in the region of the silk fixation stitch on the right, none on the left. *Vaginal Examination*—Uterus in good position against the abdominal wall. No masses or areas of tenderness in the pelvis. Discharged improved. June, 1916, examination at my office shows no change except that the induration has practically disappeared. January, 1917, seen at her home. She feels well, has no pain, and is at work. August, 1917, reports she is well, and has had no pain since last seen.

X-RAY THERAPY IN TINEA TONSURANS (CHRONIC).

BY ARTHUR R. PILLSBURY, M.D., WRENTHAM, MASS.

THE current trend of opinion for the eradication of ringworm of the scalp in young children by means of the x-ray is to substantiate faith in the massive dose method. The accompanying photographs (Figs. 1 and 2), however, show the comparative quick and successful healing of an inflamed papulous ringworm infected area and growth of healthy hair by a fractional dose method.

The infection was resistant to the ordinary parasitic agents, and the lesions previous to exposure of the x-ray remained active and contagious for months. Fig. 2 shows the same child after twelve to fifteen x-ray treatments, exposing the area for short periods twice a week. The extent of the x-ray dose may be measured by pastiles. An interesting feature in the study of twelve chronic cases was the concurrent microscopic examinations of infected hairs removed from the ringworm area. It was observed that as the treatment advanced, the num-

Fig. 1.

Fig. 2.

ber of microsporons and spored fungi lessened with each exposure. The comparative numbers of these bodies served as an index to the extent of the condition present. No appreciable epilation was observed in any of the cases after treatment was begun. But on the contrary, as the hair became more firmly rooted, instead of finding a broken off and branched condition of hair growing in the area, it approached the normal. Undoubtedly this method of eradicating ringworm infection where numbers of children live together, will prove successful.

Book Reviews.

A Treatise on Regional Surgery. By Various Authors. Edited by John Fairbairn Binnie, A.M., C.M., F.A.C.S., Kansas City, Missouri. Vol. I. With 351 illustrations. Philadelphia: P. Blakiston's Son and Company. 1917.

Dr. John Binnie, well-known throughout the United States and Europe, writes a brief and characteristic preface to this new three-volume textbook; the preface is only a trifle more than a half page in length, and deserves to be quoted almost in full. The following paragraph gives an idea of the scope and plan of the work:

"The aim of the present work is to present short treatises on the injuries and diseases of the different regions of the body.

"To each of the authors who kindly consented to contribute, the editor sent an estimate of the length of the article desired along with a request that the contents be practical and consist of the opinions of the author himself and not a statement of what 'he thought other people would think that he ought to think.' The authors were further invited to use illustrations wherever they deemed such necessary to illustrate their text, but not for merely decorative purposes.

"In the following pages one can judge how the individual authors interpreted and carried out these requests, as the editor has not presumed to interfere in the slightest degree with the material contained in the various chapters.

"For the plan of the work the editor is responsible; for its execution the responsibility lies with the surgeons of America, Britain, and far-off Australia, who so kindly consented to help him."

This first volume contains 23 chapters and an index. It is a book of 550 pages, clearly printed and satisfactorily illustrated. Dr. Binnie himself contributes six chapters, or sections. Among the other writers are the Drs. Mayo, Bloodgood, Chevalier Jackson, Samuel Robinson, McWilliams and Sir H. L. Maitland.

The book creates a distinctly favorable impression. All of the chapters are interesting and adequate; many cover subjects not suggested in their headings: for instance, "Inflammatory Affections of the Neck" includes injuries, aneurysms and tumors; and the chapter on "Larynx, Trachea and Bronchi" also treats of the esophagus and stomach.

The section on The Thyroid is particularly good; the same may be said of other sections, as The Breast, The Larynx and The Neck.

Dr. Binnie is publishing what seems at first to be a System of Regional Surgery; on closer scrutiny, however, it appears to be more accurately described as a single good-sized textbook in three volumes. The book is strongly recommended to surgeons and advanced students.

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ERNEST GREGORY, *Manager,*
126 Massachusetts Ave., Corner Boylston St., Boston, Massachusetts.

THE WORK OF THE ARMY VETERINARY SERVICE.

IN the *Journal of the Royal United Service Institutions*, Major J. W. Rainey gives a description of the work of the army veterinary corps in France. It is a remarkable account from many points of view,—sanitary, bacteriological, economic, and military. At present this is one of the matters that the British and French manage better than we do. The horses of the British army are better than ours in condition—better for transport, battle, and ambulance purposes, and their cavalrymen and transport riders are taught to be most careful of their charges. The importance of these details cannot be overestimated. The result of scant attention to veterinary work is a loss of animal life, which means a shortage of horses, and which must be severely felt in military operations for the duration of the war.

The horses do the same work as the men; they are subject to the same accidents and diseases, and if they are not recklessly wasted and left to die when sick it is because of the existence of the veterinary corps. The veterinary corps is one of the youngest branches of the army organization, but it has more than justified its existence. Major Rainey gives some interesting statistics which show that, to put the matter on its most practical basis, the veterinary service has paid for itself by the number of horses whose lives it has saved. The horse mortality, which in the South African War reached the high figure of 55%—partly because sick horses had to be shot lest they should be found abandoned, but chiefly because there was no veterinary corps—has been reduced to 13% for the year ending December 31, 1916. It was 14.80% in 1912, and there is much hope that, when there is a larger veterinary personnel, it will be reduced still further. The value of this work will be realized when it is understood that the total animal strength of the British army in France is many hundreds of thousands of horses and mules.

Trench fighting has certainly stopped or modified cavalry work, and so reduced the mortality of horses in action; but continuous wet, and transport work in flooded country along roads broken up by heavy motor traffic, have been responsible for a large amount of horse pneumonia and influenza. Most of these animals would certainly have died had it not been for the veterinary corps; as it is they are taken to veterinary hospitals and convalescent horse depots, of which there are thirty at the front and more are preparing. Each hospital is organized to deal with the treatment of 1250 horses and mules, and with the discipline, training, and general welfare of over 400 non-commissioned officers and men. The work is not only remedial but preventive, since it is necessary not only to relieve the field units of all sick animals, but to keep a sharp eye on the outbreak of epidemic disease, which, if unchecked, might seriously paralyze the activities of the troops. Up to the present it has been found necessary to take the temperature of each animal daily, and to practise tests with mallein. Anyone who has made mallein or other tests, for glanders, will fully agree with Major Rainey that the work is of the most arduous kind, requiring trained bacteriologists and skilled veterinary surgeons. Mallein is produced at the Pasteur Institute in Paris, and the injection is

made into the eyelid with a very fine needle. If the animal is glandered a swelling of the eyelid occurs, accompanied by a more or less profuse discharge from the eye. There is no reaction in healthy animals. In diagnosis, several preliminary difficulties must first be disposed of. At the last resort the distinction between animals and man, between human and equine pathology, fades away. But in practice there is a clear and simple distinction. A horse cannot report himself sick; he must therefore be inspected once daily by someone who is competent to detect incipient symptoms of disease. The thermometer is invaluable as a guide, but, as a general rule, it is not easy to discover the first symptoms of diseases like equine influenza and pneumonia. Another difficulty is the treatment of parasitic skin diseases. These appear to be especially common, since horses, like men, suffer grievously from lice. The veterinary hospitals are equipped with huge baths or tanks, containing antiparasitic solutions, into which the horses are plunged. Prevention being better than cure, it is customary to bathe and groom the animals as a routine, prophylactic measure. It seems difficult to suggest any mode of medical practice so laborious, and it is only just to dwell upon the gallantry and devotion of our veterinary colleagues. A word is also opportune in regard to the general scientific aspects of their work. There has been a progressive increase in the precision and success with which prophylactic measures have been employed, so that almost from day to day veterinary physicians and surgeons have learned to predict more surely the effect of their treatment. Thus, anthrax, a disease that once was very common, is now rather rare, and the prevention of ratbite fever, infectious jaundice, and malaria is much better understood. The result, as the *British Medical Journal* has just observed, is a triumph of what may be called "team work" on the part of the different branches of the medical profession. Thanks to this coördination, the discovery in Japan that Weil's disease, which was formerly ascribed to infection by bacillus proteus fluorescens, is really due to a spirochete, has been confirmed by British officers on the Western front. It is needful to emphasize these matters, for there is some danger that in this country the excellent veterinary material will be overlooked. In fact, there is even now a lack of horses and mules, which means a lack of men. In the British army the veterinary corps is enthusiastic and highly efficient. To every division and cavalry brigade is attached a veterinary section, with an officer and 23 A.V.C. men, but there is the difficulty to find the necessary personnel.

ANAPHYLAXIS IN SYMPATHETIC OPHTHALMIA.

THE special danger of operation or injuries to the eye, other than the intrinsic results of such injury or operation, has long been understood under the term "sympathetic ophthalmia." But the reason why injury or operation on one eye should have a deleterious effect upon the healthy eye was not understood. The reasons were broadly intimated in the light of the studies in anaphylaxis, and corroborated by recent special investigations into the causes of this special tendency to sympathetic ocular inflammation. Heretofore the ophthalmic surgeon hesitated about performing operations upon the eye or made prognoses even after mild injuries very guardedly. The surgeon understood and still understands that in the event of inflammation occurring sympathetically in the healthy eye, only removal of the offending eye can give certainty of saving the previously healthy one.

Before modern experimentation a number of hypotheses were advanced in explanation of this condition. The mycotic theory held that the sympathetic inflammation was metastatic. This becomes plausible in bacterial inflammations of the offending eye, but it can hardly explain the non-infectious ophthalmias. In the cytotoxic theory it was held that the disintegrating cells in the offending eye produced an autocytotoxin, which were specific for uveal cells of the other eye; and when carried thereto by the blood stream set up the uveitis associated with the sympathetic inflammation. But when serum was prepared according to this notion there was set up a very severe iridocyclitis when injected into animals under experimentation. The modern theory of anaphylaxis in connection with the sympathetic uveitis rather explains the reason for this severe iridocyclitis. Under the anaphylactic theory the disintegrating uvea of the injured eye becomes reabsorbed as antigen, whereupon it causes a hypersensitization of homologous tissue, which is here the

uvea of the innocent eye. If this absorption is continued beyond the point of tolerance in sensitization, this sensitization passes on to an intoxication manifested clinically by inflammation of the homologous uveal tissue. The period of latency elapsing between the injury or operation of the offending eye and the sympathetic inflammation in the innocent eye is the period required for sensitization, and lasts from two to six weeks. It is the further absorption of disintegrating cells which breaks the point of tolerance and causes the trouble.

Although the antigen obtained from this source can sensitize the entire system, only homologous tissue takes part in this anaphylactic reaction, the uvea or some constituent part of it acting as the foreign protein. This sensitization is most marked in animals of the same species but this specific anaphylactic or specific chemical reaction may occur when foreign species are used in the experimentation. It is the uvea, then, that acts as a foreign protein and which has this peculiar organ specificity. The absorption of homologous uvea may cause an unmanifested sensitization until there is an insistent profusion, when distinct ocular reactions follow. But the uvea is composed of many tissues, smooth muscle, connective tissue, blood vessels and pigment epithelium, and only one of them, the pigment epithelium, is peculiar to uveal tissue. The injury of uveal tissue liberates this pigment epithelium, the absorption of the pigment being responsible for the formation of this particular antibody. It is the pigment of the pigment epithelium which acts as the antigen on reabsorption and causes both the sensitization and the intoxication inflammation. Unfortunately, much of this work was perforce carried on in animals, and it is hoped that application in man will soon evolve a remedy for this condition.

MEDICAL RELIEF FOR HALIFAX.

On the evening of the day of the Halifax disaster, the American Red Cross chapter sent a unit of thirty physicians and seventy nurses with supplies to the stricken city. The unit was under the command of Major S. H. Wolcott of the State Guard, assisted by Llewellyn Howland, Elton Clark, George H. Watson, railway expert, and Albert J. Flint of the Imperial British Relief Fund. The medical staff was under the direction of Dr. W. E. Ladd of the Boston City Hospital, and Miss Edith Cox of the Faulkner Hospital supervised the nurses. The train carrying the unit was made up of four sleepers with a dining car and six baggage cars carrying equipment for a five-hundred-bed hospital.

The hospital equipment was that prepared for Base Hospital Unit 5, the Peter Bent Brigham Hospital Unit, now in France, which took charge of a hospital at the front, already equipped. For this reason the equipment originally prepared for it had been stored at 274 Summer Street. All the bedding, including sheets and blankets, drugs, medicines, surgical instruments, rubber goods, enamel ware, surgical dressings and the like were taken along. A large amount of emergency supplies was furnished from the Red Cross Bureau of Supplies at 1000 Washington Street. Forty-two cases were sent containing 1194 hospital bed shirts, 100 flannel pajamas, 1466 bath robes, 1168 woolen and knitted sweaters, 1116 woolen mufflers, 1020 pairs of knitted socks, 500 woolen wristers, 1000 comforters, more than 1000 knitted helmets, 2100 gauze bandages, 1500 gauze compresses, 380 absorbent pads and 3871 gauze sponges. The train carried thirty-one cases of sterilized surgical dressings from the Peter Bent Brigham Hospital.

Major Harold G. Giddings of the State Guard headed the delegation of physicians. Others were Captain Robert D. Long, Major Edward A. Supple, Major Donald V. Baker, Major George W. Morse, Major Peter Owen Shea, Captain E. Fred Murphy, Captain Thomas F. Harrington, Dr. Nathaniel Morse, Captain Dewitt Wilcox, Captain John W. Dewis.

No. 2 Unit, which followed, included Dr. Freeman Allen, Dr. Franklin Balch, Dr. Arthur N. Broughton, Dr. John W. Cunningham, Jr., Dr. Robert L. DeNormandie, Dr. Kenneth L. Dole, Dr. T. J. Eastman, Dr. James M. Gallison, Dr. W. P. Graves, Dr. W. W. Howell, Dr. Foster S. Kellogg, Dr. John Mason Little, Dr. A. W. Reggio, Dr. W. A. Rolfe, Dr. Malcolm Seymour, Dr. R. H. Stephens, Dr. J. B. Swift, Jr., Dr. Richard Wadsworth, Dr. Hugh Williams, Dr. F. W. Adams, Dr. Gerald Blake and Dr. J. W. Sever.

This unit occupies the buildings of St. Mary's College and maintains a hospital of 400 beds.

The Providence chapter of American Red Cross sent a unit consisting of thirty-seven physicians and fifty nurses, increased to a total of one hundred persons by reinforcements from New Bedford, Woonsocket and Fall River. From Augusta, Maine, ten physicians of the Medical Reserve Corps and a shipment of supplies left for Halifax. The Red Cross train which left New York had on board articles valued at more than $200,000. Several special trains were made up to transport a special salvage corps of 600 men under twenty engineers, who will restore whatever houses can be saved and direct the construction of temporary shelters as rapidly as possible.

Mr. John F. Moors has been made head of the Red Cross delegation, because of his wide experience gained while directing reconstruction forces in San Francisco after the earthquake, and at Chelsea and Salem after they were visited by fire calamity. In reporting conditions at Halifax soon after his arrival, Mr. Moors stated:

"From information so far received, I estimate that nearly 2000 were killed and perhaps 3000 severely wounded. Having been at San Francisco, Chelsea and Salem immediately after those disasters, I am impressed by the fact that this is much the saddest I have ever seen. After the others the military took immediate charge of the relief work. In this instance responsibility fell immediately upon civilians. The burden thus was exceptionally heavy.

"Another group of 25 doctors and 70 nurses took possession of St. Mary's College this morning and with vigorous assistance of United States jackies, are making what was a shattered building, with snowdrifts on the floor, like the beginning of a splendid hospital.

"The American doctors and nurses have taken such buildings as were available, and are converting them into model hospitals with skill and energy amazing to everybody here.

"Altogether within the past 24 hours more than 200 American doctors and nurses have found immediate employment. There are here now at least 300 of the very best physicians, social workers and trained nurses of the United States, each finding his place with true resourcefulness.

"Another group of 50 doctors and 50 nurses has begun a systematic house-to-house canvass of those parts of the city where wounded are still lodged in great numbers without medical care."

MEDICAL NOTES.

AN ADVANCE IN STATE HOSPITAL WORK.—In compliance with a resolution recently adopted by the Morris County Medical Society that "if possible, at least three hospitals in the county establish a clinic for the treatment of syphilis or specific blood disorders," the Board of Managers of The New Jersey State Hospital at Morris Plains at its recent annual meeting authorized the establishment of such a clinic at this hospital. Through the liberality of high-grade drug concerns, the necessary drugs are to be provided without expense to the hospital or State. Prior to this there has been no way by which those unable to pay could receive such necessary treatment; an innovation of a public, charitable character.

NATIONALIZATION OF BRITISH MEDICAL PROFESSION.—A bill is to be brought forward by Dr. Christopher Addison, minister of reconstruction, in Parliament, aimed to accomplish the nationalization of the medical profession in Britain. Premier Lloyd George is reported as advocating it, stating his belief that the time is ripe for a change, holding that nobody should be prevented or deterred from obtaining the best medical attendance on score of cost or charity.

DEAF-MUTISM IN ITALY.—A report of deaf-mutism in Italy states that in 1911 there were 27,608 persons so afflicted, and 28,357 persons who were blind. For deaf-mutes, Lombardy headed the list with 5363, and Piedmont came next with 3496. The largest number of blind persons was in Sicily, where the number was 3462.

THE CLINICAL ASSOCIATION OF AMERICAN PERORAL ENDOSCOPISTS.—On Nov. 1, the Clinical Association of American Peroral Endoscopists was organized in Philadelphia.

The purpose of this new society is, in the words of its constitution: "The study of diseases and accidents occurring in the respiratory and upper digestive tracts, or borderline conditions and their treatment, medical and surgical, by direct inspection."

This Association also aims to impress on the internist and general practitioner the value of bronchoscopy and esophagoscopy as diagnostic methods of precision, so as to make possible the accurate ocular study, in the living subject, of pathological conditions of the esophagus and lungs.

The officers of the Association are: president, Chevalier Jackson, Philadelphia; vice-president, Hubert Arrowsmith, Brooklyn; secretary-treasurer, Henry L. Lynah, New York; members of the executive committee, Wolff Freudenthal, New York, and Samuel Iglauer, Cincinnati.

WAR NOTES.

DEATHS AMONG AMERICAN TROOPS IN FRANCE.—For the days of December third to tenth, inclusive, General Pershing reported as follows of deaths among American troops in France. Pneumonia, both lobar and broncho- and complicated in some cases by measles, accounted for seventeen deaths, meningitis caused three deaths, and affections of the heart, three, one from scarlet fever and one from typhoid. Two were killed in action and one died as the result of wounds.

DECORATION OF AMERICAN SANITARY SECTION.—The American Sanitary Section No. 5, in foreign service, has been awarded the "Fourragere," a French military decoration worn on the left shoulder. This section has already received two official citations. The communication accompanying the decoration stated that, "This glorious distinction is a merited reward for the brave men composing the section, who on a famous battlefield have given evidence of the fraternity and solidarity between the soldiers of France and America, united in the common cause."

HEALTH IN ARMY CAMPS.—The following report is issued of health conditions in army camps:

Although health conditions generally in the National Army and National Guard camps showed improvement during the week ending November 30, the number of deaths materially increased.

The report of the division of field sanitation, made public yesterday, shows that there were 164 deaths among the Guardsmen, as compared with 97 the previous week and 79 among the draft men as against 60 the preceding week. One hundred and thirty-four of the Guardsmen and 39 of the draft men died from pneumonia, and nine of the former and fifteen of the latter died from meningitis.

Only two divisions, the 34th (Guard) and the 87th (National Army) reported an increase in cases of measles and the number was small. In the divisions where there has been an epidemic of measles the disease apparently has been brought under control.

Reports from all divisions in which pneumonia has been prevalent show a decrease in the number of new cases except the 36th (Guard). Decided improvement is noted in the 30th and 31st (Guard) divisions, where extensive outbreaks of the disease have occurred. Conditions also have improved in the 30th (Guard) and 89th (National Army) divisions.

In the 36th (Guard) division the measles outbreak, which reached its height last week, has been followed up by an epidemic of pneumonia. The death rate in this division, however, has been much lower than in any other division in which pneumonia has been prevalent.

Because of the prevalence of these epidemics, radical changes may be made in plans for officers' training camps to be opened a month hence. Instead of opening new camps at cantonments where measles and pneumonia are rampant, plans may be made to establish one large training camp for all Southern men at Leon Springs.

NEED OF ARMY NURSES.—A call is issued for four hundred and seventy-five graduate nurses for immediate and urgent Army service, and in the course of the next year at least 20,000 more nurses will be required. Miss Dora E. Thompson, superintendent of the Army Nurse Corps, stated that of the total number of graduate nurses in this country, approximately 80,000, only 3500 have so far been assigned to duty in the army service, and of this number 1500 are in France. The Red Cross, which is the reserve of the Army Nurse Corps, enrolled some 13,000 nurses, and hundreds of these women are now in the service, but for various reasons a great majority of the 13,000 have not reported as available for immediate duty. Any nurse who is qualified for service should not hesitate to make her application today. Her services are, or presently will be, needed by the army.

The Army Nurse Corps will supply personnel to about 100 base hospitals in this country, to many base hospitals abroad, each with 100 nurses, and to hospital trains, hospital ships and the evacuation hospitals.

WAR RELIEF FUNDS.—On Dec. 15 the totals of the principal New England war relief funds reached the following amounts:

French Wounded Fund	$304,143.06
Armenian-Syrian Fund	267,173.72
French Orphanage Fund	134,220.09
Polish Fund	93,523.73
Italian Fund	80,052.76
War Dogs' Fund	2,168.28

BOSTON AND MASSACHUSETTS.

WARNING AGAINST SMALLPOX.—The Health Department of Boston has recently sent out the following letter relative to the possibilities of smallpox infection:

"Cases of smallpox have been discovered in Boston during the past week that have been walking about and riding in the Elevated trains and street cars, thereby exposing the community to infection.

The Health Commissioner earnestly recommends and strongly advises everyone, both adult and child, who has not been successfully vaccinated within seven years, to be vaccinated at once. This is your bounden duty, not only for your own personal protection, but for the public welfare. Let no one, or no argument, keep you from doing your duty *now*.

Smallpox is so readily controlled by vaccination, that it is almost criminal for a person not to take advantage of such a protective measure. The slight inconvenience arising from vaccination is as nothing when compared to the rav-

ages of the disease itself. If a person happens to be immune, there is no inconvenience at all.

There is no physical condition which contraindicates vaccination, and if there is an extensive outbreak of the disease in this city, it will be the fault of the citizens themselves in refusing to take advantage of precautionary measures.

WEEK' DEATH RATE IN BOSTON.—During the week ending Dec. 15, 1917, the number of deaths reported was 229, against 201 last year, with a rate of 15.48, against 13.78 last year. There were 33 deaths under one year of age, against 32 last year.

The number of cases of principal reportable diseases were: diphtheria, 124; scarlet fever, 34; measles, 81; whooping cough, 44; typhoid fever, 2; tuberculosis, 44.

Included in the above were the following cases of non-residents: diphtheria, 9; scarlet fever, 2; measles, 1; tuberculosis, 2.

Total deaths from these diseases were: diphtheria, 4; measles, 8; whooping cough, 2; tuberculosis, 20.

Included in the above were the following non-residents: measles, 1; tuberculosis, 2.

NEW DEPARTMENT OF CITY HOSPITAL.—The new West Department of the City Hospital, to be used for communicable diseases in children, was opened for the reception of patients on December 14. Mr. Shuman, president of the board of trustees, in writing to the Mayor regarding the use of this hospital stated as follows:

"Communicable diseases are prevailing in Boston to such an extent as to give the trustees of the Hospital Department considerable anxiety. The South Department can decently care for but 345 patients. There are today 320 patients there. You are aware of the fact that in recent years we have been compelled to open up the Southampton wards, which are not at all adapted for the care of contagious diseases.

"Through your foresight, the present West Department was transferred to the City for the extension of the South Department and the building formerly occupied by the Parental School has now been remodeled for such purpose. To provide for even a slight increase, the trustees deem it imperative immediately to open two buildings at the West Department, one for the care of diphtheria and the other for the care of whooping cough. This is an emergency which must be met immediately."

SPRINGFIELD ACADEMY OF MEDICINE.—The December meeting of the Springfield Academy of Medicine was held in Commercial High School Hall on Tuesday, December 11, 1917. The program consisted of moving pictures of clinical and war surgery.

The teaching courses will be held on Fridays from 4 to 6 p.m., beginning January 4, 1918. There are two courses as follows:

SURGERY.

Jan. 4. Dr. J. B. Blake. Recent Advances in Surgery.
Jan. 11. Dr. C. F. Painter. Surgical Lesions of Bone.
Jan. 18. Dr. W. H. Porter. The Surgeon at War.
Jan. 25. Dr. J. B. Blake. Surgical Diseases of the Abdomen.
Feb. 1. Dr. J. H. Cunningham, Jr. Genito-Urinary Diseases.
Feb. 8. Dr. E. P. Richardson. Minor and Traumatic Surgery.

MEDICINE.

Feb. 15. Dr. W. H. Smith. Circulatory Diseases.
Feb. 22. Dr. E. H. Place. Infectious Diseases.
March 1. Dr. J. B. Hawes, 2nd. Syphilis and Tuberculosis
March 8. Dr. H. F. Hewes. Diseases of the Gastro-Intestinal Tract.
March 15. Dr. E. P. Joslin. Diseases of Metabolism.
March 22. Dr. H. W. Bowditch. Modern Diagnostic Routine.

Courses are open to members of the Academy upon payment to the Treasurer of registration fee of $5.00 for each course.

Registration in each course is limited to 25 members. L. D. CHAPIN, M.D., *Secretary.*

The Massachusetts Medical Society.

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WORCESTER DISTRICT MEDICAL SOCIETY.—Revised list of physicians in military service of the United States or the Allies:

U. S. ARMY.

Medical Officers' Reserve Corps.

(*a*) On Active Duty.

Dr. Howard Beal, Worcester
Dr. Edw. B. Bigelow, Worcester
Dr. Frank W. George, Worcester
Dr. Roger Kinnicutt, Worcester
Dr. E. B. Simmons, Worcester
Dr. William E. Denning, Worcester
Dr. Willard Lemaire, Worcester
Dr. James J. Goodwin, Clinton
Dr. Chester C. Beckley, Lancaster
Dr. Roger Schofield, Worcester
Dr. Merrick Lincoln, Worcester
Dr. George C. Lincoln, Worcester
Dr. E. F. Phelan, North Brookfield
Dr. R. S. Newton, Westboro
Dr. William J. Fay, Worcester
Dr. A. K. Yoosuf, Worcester
*Dr. James V. May, Worcester
Dr. Samuel C. Gwynne, Worcester
Dr. Harry P. Cahill, Worcester
Dr. Israel Lurier, Worcester
Dr. Donald Gilfillan, Worcester
Dr. D. F. O'Connor, Worcester
Dr. Homer Gage, Worcester
Dr. D. A. Thom, Worcester

(*b*) Commissioned, but not yet called to Active Duty

Dr. George F. Little, Uxbridge
Dr. Willard P. Stapleton, Worcester
Dr. Frank T. Oberg, Worcester
Dr. H. L. Simmons, Worcester
Dr. Charles Salmon, Worcester
Dr. David Bridgewood, Worcester

Staff Officer 104th Infantry.

Dr. Joseph O'Connor, Worcester

U. S. NAVY.

Dr. Gilbert Haigh, Worcester
Dr. Linwood Johnson, Worcester
Dr. Thomas Courtney, Worcester
Dr. Joseph L. Lannois, Northboro
Dr. Winthrop Adams, Worcester

U. S. SELECTED SERVICE.

(*a*) Local Boards

Dr. James C. Austin, Spencer
Dr. Edw. W. Balmer, Whitinsville
Dr. J. Arthur Barnes, Worcester
Dr. Frederick Bryant, Worcester
Dr. John F. Harkins, Worcester
Dr. Ernest L. Hunt, Worcester
Dr. William W. McKibben, Worcester
Dr. A. J. McCrea, Southbridge
Dr. George L. Tobey, Clinton

(*b*) Medical Advisory Board.

MASSACHUSETTS HOME GUARD.

Dr. L. F. Woodward, Worcester
Dr. C. A. Sparrow, Worcester
Dr. Roy J. Ward, Worcester
Dr. Frank L. Magune, Worcester
Dr. George F. H. Bowers, Worcester
Dr. Peter O. Shea, Worcester

ENGLISH ARMY (Harvard Unit).

Dr. Kendall Emerson, Worcester
Dr. Oliver Stansfield, Worcester
Dr. Stanley Bridges, Worcester
†Dr. George Watt, Worcester

ENGLISH HOSPITALS.

Dr. Albert O. Raymond, Worcester
Dr. William H. MacKay, Worcester

AMERICAN AMBULANCE (Paris).

Dr. W. Irving Clark, Worcester

The Medical War Committee invites information to supplement or correct this list. Doctors joining the Colors should notify the committee and indicate their wishes with regard to sharing the fees derived from their patients.

ERNEST L. HUNT, *Secretary*.

* Honorably discharged.

† Enlistment expired.

Obituary.

EDWARD A. AYRES, M.D.

DR. EDWARD A. AYRES of Branchville, N. J., a well-known physician of New York and writer on medical subjects, recently died after a four days' illness of pleuro-pneumonia. Early in his career Dr. Ayres was prominent in New York literary and medical circles. He was professor of obstetrics in the New York Polyclinic Medical School for twenty years and was founder and president of the Mothers' and Babies' Hospital of that city. He won the Carpenter prize at the New York Academy of Medicine with his essay on "The Mosquito as a Sanitary Problem." This appeared in M. G. Fulton's "Expository Writing" as one of the fifteen best examples of the English language. He was also the author of "Physical Diagnosis in Obstetrics." He invented various medical instruments and also a hospital operating bed now used in New York infirmaries. Dr. Ayres was a member of the Felborn Academy of Medicine, an honor man of the Brooklyn Medical Society and a member of the Salmagundi Club.

ORRAN GEORGE CILLEY, M.D.

DR. ORRAN GEORGE CILLEY died at his home in Boston, December 9, 1917, following a short illness. He formerly was prominent here as a coroner, before the days of medical examiners.

Dr. Cilley was born in Pittsfield, N. H., on April 4, 1840, the son of Jonathan E. and Elizabeth Cilley. He received a common school education in the town of Canterbury, where he resided during his youth, and afterward attended the seminary at Northfield, N. H. He was a student for two years at the Harvard Medical School and graduated at Dartmouth Medical School in 1868. He then studied medicine with Dr. Sawyer of Biddeford, Me., for a period of two years. He came to Boston in 1869, and settled at 35 Cambridge Street, where he had been in active practice ever since. He moved his home to Charles street about two years ago.

Dr. Cilley was appointed coroner by Governor Washburn and held that position for five years, until the present law creating medical examners went into effect, in 1877. In February, 1873, he was appointed surgeon of the First Battalion of Cavalry, M.V.M., and held the position for six years. He was physician for many years at Charles Street Jail, until about two years ago. He was a thirty-second degree Mason. In 1884 he received from Dartmouth his A.M. degree. The previous year, 1883, he was appointed Surgeon-General of Massachusetts. Dr. Cilley, who was a widower, is survived by a daughter, Miss Dorothy Cilley, who lives at the family home in Charles Street.

Miscellany.

FARM COLONIES FOR TUBERCULOUS SOLDIERS.

IT is stated in the *British Medical Journal* that during the past year the National Association for the Prevention of Consumption has urged the formation of farm or garden colonies, where discharged tuberculous soldiers, while regaining their health, may be trained in open-air occupations. At the annual meeting of the Association on July 16, Professor Sims Woodhead sketched his own idea of a model farm colony. It should consist of a large enough tract of land to allow variety in the forms of cultivation introduced. The aim was not only to provide the patient with suitable and congenial work, but also to give him an occupation which should serve him as a means of livelihood, and a part of the farm colony, therefore, should be laid out on a generous allotment system. The colony should serve as an educational center and show how much could be done to improve the conditions of farm workers and the hygiene of farm buildings. To that end every farm colony should be a microcosm in which the maintenance of health and the prevention of infection should be absolutely secured. He thought also that accommodation should be provided for advanced cases. As far as possible, the patients should do the whole work of the colony themselves, and even the overseers should be tuberculous patients who were coming to the end of their term. The patient should help to contribute to the cost by his own labor. The state must provide the land, and it might also contribute towards preparation of the land and erection of the general buildings. But the special buildings, particularly the hospital buildings, should be jointly provided by local taxation, treasury loan, and voluntary subscription. As the patient got stronger a certain portion of his earnings should be set aside as a bonus for him when he made a new start in life. In the subsequent discussion Sir R. W. Philip suggested that there was some risk of opening the door of the farm colony too wide. If the colony was to be a dumping ground for all grades of tuberculosis, its purpose would be defeated. There must be a clear separation between early and presumably curable cases and dying cases; for the latter, of course, humane provision must be made, but not that of a farm colony. The class of cases to be taken were those which lasted a much longer time than the sanatorium could afford to keep them. Sir William Osler said that the essence of success in the treatment of the consumptive soldier was that he must remain a soldier—that is, he must be under control. Discipline was a very necessary factor in the life of a farm colony. Sir A. Griffith-Boscawen, M.P., parliamentary secretary to the Ministry of Pensions, said that his department had been faced with the difficulty that medical boards had generally assumed that when a man was discharged for tuberculosis the condition was not attributable to military service, and the result was that until lately the man had been turned adrift without pension or other provision. In France in such cases the benefit of the doubt was given to the man. The conditions of the service might at least have brought out the disease earlier than it would otherwise have manifested itself. The policy now was to assume in all cases that the disease was the result of military service unless the contrary was clearly proved.

Correspondence.

CONTAGION IN SCARLET FEVER.

West Newton, Mass., Dec. 10, 1917.

Mr. Editor:—

May I be permitted to differ from the conclusion drawn by the otherwise excellent editorial on the "Duration of Contagion in Scarlet Fever" in the JOURNAL of Nov. 29th?

I think that no well-informed health officer believes today that infection in scarlet fever is transmitted by the scales of desquamation, and the phrase "As long as there is desquamation there is infective discharge from mucous membranes" is misleading, because it does not go far enough.

The infective discharge from the nasal mucous membrane may continue long after desquamation has ceased.

It is, of course, impossible to determine beforehand the actual necessary period of isolation in any given case, and for that reason a minimum period should be laid down which can be lengthened if necessary.

The report of the Committee on Control of Communicable Diseases of the American Public Health Association, the Chairman of which is Dr. Haven Emerson of New York, states that the period of communicability in scarlet fever is "four weeks from the onset of the disease, and until all abnormal discharges have ceased and all open sores have healed." This, of course, includes discharges from suppurating glands and ears.

The present tendency among health officers is to make the period of isolation as short as is compatible with safety and to lengthen it when necessary in any individual case, rather than to impose a maximum period for all cases; in other words, to make it as short as possible instead of as long as possible.

FRANCIS GEO. CURTIS, M.D.,
Chairman, Newton Board of Health.

RELIEF OF BELGIAN AND FRENCH PHYSICIANS.

Baltimore, Dec. 8, 1917.

Mr. Editor:—

In order to further the subscriptions to the fund now being collected by Dr. W. W. Keen of Philadelphia for transmission to our Belgian and French colleagues to help them in re-establishing themselves in their homes and offices, I should be very glad if you could find space to print the enclosed letter which I have received from Dr. Triboulet of Paris. Dr. Triboulet is a distinguished physician of the Hôpital Trousseau, and was in this country at the time of the International Congress on Tuberculosis in 1908. All that he says can be relied upon perfectly.

Believe me,

Very sincerely yours,
HENRY BARTON JACOBS.

25 Avenue d'Antin, Paris, VIIIe.

Dear Dr. Barton Jacobs:—

After three years of the most frightful cataclysm, France is always up. She has saved herself and the civilized world; at what cost you may think of it by the narrations you may read; they are nothing compared with the reality. Some of the oldest and richest provinces (in soil, industry, and art) are now a desert. Today, tomorrow, and the days after tomorrow we must use all our energy and money in building again and in helping those who are in awful distress. Among the latter are the medical faculties, and I hesitate no more to send you and the U. S. confrères the most earnest appeal. If indiscretion is not too great, will you allow me to ask you to be an intermediary for this international medical problem; to give our spoiled confrères the necessary means to come back and live in their devastated homes? The French Medical Associations will collect nearly a Million Francs by corporations, private funds. In our Northern invaded departments (Oise, Somme, Pas de Calais, Aisne, Nord, Marne, Ardennes, Meuse et Meurthe et Moselle), there are 2000 doctors. From these 2000 confrères, *1000*, at least, will want material help to begin again their professional life, and we think five thousand francs—5000 Fs., the necessary sum of money for each one. The million we possess is every day lessened by the necessity of immediate help to the expelled medical families, when repatriated day after day, or week after week.

Enclosed you may find printed matter showing some instances of what we do and of what is to be done. I am sending the same appeal to Dr. Pearce Bailey, one of my friends in New York. Perhaps you could give me some new addresses anywhere?

I hesitated a long while before writing this. U. S. A. did do, and will do so much for France, that one is quite ashamed to ask again! But proudness is unreasonable in such questions, and I make myself very humble for the sake of the confraternal misfortunes. A sort of incitement came a few days ago when the Uruguay confrères sent us spontaneously 35,000 francs in a cheque.

Please, dear Dr. Barton Jacobs, excuse this long and tedious affairs letter. You know the reasons that inspired me. Please agree my most respectful regards for Madame Barton Jacobs, my best remembrances and wishes for the beloved Johns Hopkins Medical and Surgical Staff, and believe me,

Yours very heartily,
28/5/17. Henri Triboulet.

My family gave three "poilus" to dear France; one —aviator, one artillery officer; both wounded and cured, and started again; the third in Engineers Corps, a young 18½ fellow.

Magnin's son is a brave little one; he is in the Salonica Army in the medical staff. French, and I am sure U. S., youth is full with ardor and confidence. "On les aura" is the common expression. Don't judge our people in books or in newspapers; one must see him at work; that is splendid. In a near future, you will come and see that, and you will find here an old man, very, very happy to see you at the well deserved peace-hour.

Long live the sister republics!

RECENT DEATH.

HONORÉ JOSEPH COTÉ, M.D., a Fellow of the Massachusetts Medical Society, died in Boston, of cerebral hemorrhage, Nov. 7, 1917, aged 56 years. He was a graduate of Tufts College Medical School in the Class of 1899, and was a member of the American Medical Association.

MARRIAGE.

The marriage is announced of Miss Helena M. Howard, graduate nurse of Carney Hospital, and Dr. Alfred J. Leary, of the x-ray department of that Hospital.

APPOINTMENT.

DR. R. E. STONE has been appointed to the staff of the Benjamin Stickney Cable Memorial Hospital at Ipswich, as Visiting Anesthetist.